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THE MILITARY ORGANIZATION BEST ADAPTED TO
IMPERIAL NEEDS.

By Major J. ADYE, R.A.

"Si vis pacem para bellum."

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PART I.—CIRCUMSTANCES PECULIAR TO THE BRITISH EMPIRE AND
AFFECTING OUR MILITARY ORGANIZATION.

THE old and hackneyed saying I have taken as motto contains the main principle that should run through all military organization. It marks, moreover, the distinction between peace and war, and it emphasizes the fact that peace should be a period of preparation for war.

This fact has too often been lost sight of, and is even now not fully appreciated in this country, where it is scarcely understood that a home army in peace is not and should not be as the army in war, a perfect fighting machine ready at all points; but is, on the contrary, a school in which, indeed, a trained and perfect nucleus must exist, but which is composed mainly of partially-trained soldiers, whose military education is as yet unfinished.

The moment their education is completed they are no longer wanted in the ranks of a home army in peace, for they have not only learnt their work, but if retained prevent others from learning theirs. They should therefore pass to the Reserve, there to remain until occasion may arise for their services.

This principle, by which the army in peace is a training school not a fighting machine, has long been recognized and appreciated on the continent; but, although it is now more than twenty years since it was first introduced here, it is as yet only dimly understood not only by the general public but by the army itself.

It cannot be carried to its furthest development by us because of our extended Colonial Empire, which prevents our peace army from being retained entirely at home—that is, within the United Kingdom—and it is very possibly this fact that has prevented our full comprehension of the best military organization for a modern army.

Until this distinction between a peace army at home and a war army is thoroughly mastered, no military organization having for its object success in war can be properly perfected.

There are two important points in which Great Britain differs from the other leading Powers, and which closely affect her military organization. They are her insular position, and her large and extended foreign possessions; and before considering the antecedent question "What are our Imperial Needs?" it will be as well to glance at these two circumstances which, while they add to those needs, make them also so difficult to satisfy.

The United Kingdom has no land frontier and, although in various parts of the Empire abroad—such as Canada and India—our boundaries lie partly on land, in most cases there are certain circumstances which deprive these frontiers of their full significance. Under any circumstances the invasion of the mother country could only be by sea.

The immediate result of this is to relegate our army to a secondary position, and to constitute our navy our first line of defence.

Our army, therefore, occupies the same place in relation to the State that their navy does with all the great continental Powers, whose land, and not whose sea frontiers form their chief care.

Again, our insular position has very wisely been taken advantage of to keep us aloof from continental politics and alliances, or at least to cause us to play a less prominent part in them than most of our continental rivals. History affords proofs of our immunity from invasion and freedom from participation in foreign disturbances as compared with the other great Powers. And when we take part in a European war we almost invariably do so with one or more allies.

Thus, our insular position has for various reasons rendered it unnecessary for us to maintain, either in peace or in war, the vast armies with which the leading continental nations, whose whole Empire is in no case as large as ours, are obliged to protect themselves. The result of this is that while they, without exception, adopt universal liability for military service, we are able to maintain our smaller forces by voluntary enlistment.

Hence our first great point of difference.

The United Kingdom contains, in round numbers, some 37,750,000 inhabitants, and comprises some 121,000 sq. miles.

France (to take the country with most colonies, and therefore whose condition most resembles ours) numbers some 38,000,000 inhabitants, contained in about 200,000 sq. miles.

But whereas her colonies amount to but 700,000 sq. miles in extent, and contain a little over 16,000,000 inhabitants, our Empire outside the United Kingdom spreads over some 8,000,000 sq. miles, and contains as many as 250,000,000 human beings. These numbers (taken from the "Annual Statistical Abstracts" and "Bartholomew's Handy Reference Atlas") are, of course, only approximate, and do not include the foreign protectorates of either country; but they are sufficiently accurate to afford an idea of the great difference between our Empire and that of the nation most approaching us in this respect. Were we then to distribute our military forces in proportion throughout our Empire we should retain at home but a very small portion of the whole.

This great difference between our Empire and all others cannot be too often insisted on. It may be most appreciated by reference to Table A.

The possession of large territories outside the mother country must affect the military organization which exists for the protection of the whole Empire. When the Empire consists of the home possessions only, however large they may be, as in Russia, the problem of its defence is comparatively easily solved. But when beyond the

seas exists another Empire, in our case far larger than the parent Empire, extended, moreover, throughout the globe, and not concentrated in a ring fence, the problem of defence is greatly complicated.

There are three methods by which we can garrison and defend this foreign Empire.

1st. By means of a local or native army, recruited locally.

2nd. By means of a British force, recruited in the United Kingdom for service at home and abroad.

3rd. By means of a separate British force, recruited in the United Kingdom for service abroad only.

It would be scarcely possible to maintain our foreign possessions, especially India, by any one of these methods alone, and, as a matter of fact, a local force, locally recruited, of greater or less strength, is almost invariably employed in conjunction with British forces.

The question then arises, shall this British force be one with the home army, or separate from it? Shall it be enlisted for service at home and abroad, or for service abroad only?

This is a question best considered later, but, whether the British garrison of India and the Colonies be raised for foreign service solely, or be part of the home army temporarily stationed abroad, the main fact in which we differ from our continental rivals remains the same, namely that we, having so very large and extended a Colonial Empire which, to some extent at least, must be garrisoned by British troops raised in Great Britain, have a condition to face which enters into none of their military circumstances, or if it enters at all, as in the case of France, does so to a limited extent.

And when the size of our Colonial and Indian possessions is compared with that of the United Kingdom it is very evident that a tremendous strain must be put upon our military system.

The cost of transporting men to all parts of the world and back again is excessive, and for this reason alone, independently of any question of expediency or convenience, we must adopt a period of service in the ranks which will allow of a considerable residence abroad. Moreover, these soldiers must be men of some age and experience, more or less ready to take the field, and not raw recruits, since to replace or add to them on an outbreak of war takes several weeks; and this obliges us to keep men in the ranks of the army in peace for some time after they have learnt their profession.

This is not the case on the Continent, where they are at liberty to adopt as their period of service the shortest time in which a soldier can be trained. Thus most of the continental nations adopt a service of three years or less, while Germany is about to reduce her term practically to two years.

The extent and dispersion of our Colonial Empire obliges us, therefore, to adopt a comparatively long period of service; as our insular position allows us to dispense with conscription.

These are the two main points in which our circumstances differ from those of other nations as regards the conditions under which our military forces must be maintained. There are other points of

difference, of course, but they are minor ones; and, as a rule, arise out of the two conditions named above.

I hope I have made it clear that while the main principle of military organization remains the same for us as for all other armies, the circumstances under which our Empire exists render necessary a serious departure in detail.

What this departure should be can only be ascertained by a careful consideration of our needs, and this brings me to what I have called the antecedent question of this Essay—"What are our Imperial Needs?"

PART II.—WHAT ARE OUR IMPERIAL NEEDS?

The first care of every State must be to protect its shores from invasion. When a State has no possessions outside its home frontiers the question is obviously simplified, but when a large portion of the Empire consists of colonies, many of them at a great distance from home, a new responsibility arises and a fresh series of problems occurs.

This is the case with us.

We have to guard the United Kingdom against invasion, and—second only to this duty—we have to adequately guard and garrison our foreign possessions. But an army does not only exist for defence; it may also have to assume the offensive.

And the offensive undertakings it may have to enter upon divide themselves naturally—like those of the defence—under two heads; namely, larger operations against European foes, and minor operations outside Europe, generally with smaller States and upon a smaller scale.

The four heads, therefore, under which I classify our Imperial needs are:—

- 1st. Protection against invasion of the United Kingdom.
 - 2nd. Participation in a European war.
 - 3rd. Maintenance and defence of our Indian and Colonial Empire.
 - 4th. Provision for minor campaigns outside Europe.
- An organization that will meet these requirements should satisfy all the needs of the Empire.

1. *Protection against Invasion of the United Kingdom.*

The fact that the United Kingdom can only be approached by water, while it gives us a considerable security, is not without certain drawbacks.

The very water that serves as our chief defence also serves the attacker as a means of approach.

An attack upon a land frontier may be practically impossible at certain points on account of natural obstacles, while considerations of communication, supply, &c., may render other parts impracticable.

In this way the vulnerable points of a land frontier may sometimes be reduced to a few miles of its length.

But a sea frontier is, as a rule, open to attack along its whole length, since a completely rock-bound shore is rare, and the non-existence of roads or railways does not affect the case, the sea being as good a means of approach in one direction as in another.

Thus, where a land frontier requires guarding at only certain known points, a sea frontier must, generally, be watched and guarded along its whole length.

On the other hand, the crossing of a land frontier is simple compared with the landing on a sea coast.

Once a footing is established it may possibly be necessary to meet the invader with a field army, and, if possible, oblige him to fight in a previously selected position, chosen for the advantage it confers on the defence and the disadvantage it imposes on the attack.

The Defence Scheme drawn up at Headquarters, is, I understand, based upon this general principle. It is, of course, strictly confidential, but even were it not there would be no necessity to discuss its details here.

And it is obviously impossible for me to enter into an exact calculation as to the number of men required either for coast defence or for the field force inland. Opinions differ as to the numbers we require to resist invasion, and, happily, we have no actual experience to guide us.

Sir Edward Hamley, writing in the "Nineteenth Century" for June, 1888, discussed the minimum force requisite for security, and, exclusive of the garrison of Ireland, he estimated our wants as 75,000 Regular infantry, 15,000 to 20,000 Volunteers, 7,000 cavalry, and 210 field guns, with 60 guns of position. These would form a field army independent of the coast defenders.

I shall probably not be very far wrong if I assume this field force to number some 100,000 men, or about three army corps, with a proportion of cavalry and artillery of position. And for every man we place in the field inland we should probably require two on the coast.

The least force, therefore, with which we should be prepared to resist invasion would be about 300,000 men of all arms.

This is on the supposition that these are all Regular troops.

Without doing any injustice to the excellent qualities of our auxiliary forces, it will probably be allowed that they can hardly be placed in the same category as the Regular troops, whose sole profession is that of arms, and who devote their whole energies and time to its prosecution.

And the duties of watching and defending the coasts seem particularly suitable to our auxiliary troops, who, moreover, can be permanently assigned a certain section of coast or a particular collection of defences since, unlike the Regulars, they remain at home in peace.

I should therefore be inclined to fix the numbers for home defence at 150,000 Regular troops and 250,000 auxiliary forces; or 400,000 men in all.

2. Participation in European Wars.

The second requirement to be met by our military organization I have called "Participation in European Wars."

Here, again, great difference of opinion may exist as to the number of men we should be prepared to place in the field; but here we have a certain experience before us. The European wars in which we

have borne a part in the present century may, indeed, be easily enumerated; but whether we regard the Peninsula, the Waterloo campaign, or the Crimea, we learn much the same lesson. We fought in each with allies, more or less valuable, and to each campaign we despatched at the outset no very great strength, while even in the Waterloo campaign the total British troops engaged numbered less than 36,000 men. (Chesney's "Waterloo Lectures.")

Moreover, the vast armaments of Europe have now become so swollen (thanks to short service, which enables a much greater number of men to be trained for war in a short time and at comparatively small cost), that unless we adopt conscription, and turn Great Britain into one large camp, we cannot hope to compete in numbers with the leading continental nations.

Lord Roberts, in a letter addressed to Sir Charles Dilke, and published in the "Morning Post" of July 25th, 1892, says, "It should be distinctly understood that the employment of any considerable body of British troops in the field in any European war is sufficiently improbable to make it the primary duty of the military authorities to organize our forces efficiently for the defence of the Empire."

Even did such a war come upon us without allies we should be at liberty to remain on the defensive. It does not, therefore, appear to be necessary or advisable for us to prepare a force for operations in Europe sufficient to cope with any one of the forces of the other great Powers.

But occasions may, and do arise—as in the Crimea—when we may desire to take some part in a European conflict.

In such a case it must not be forgotten that we are the first naval Power in the world, and if we gave to our ally or allies the assistance of our navy alone we should probably well bear our share of the burden; if we added to it a comparatively small but well-trained and well-equipped force, we should certainly do all that could be expected of us. Two army corps seem to be the figure at which we have hitherto fixed our aspirations in this direction, and we are, doubtless, wise to limit ourselves to a number we should be able to provide without much difficulty and to maintain and equip without too great expense.

An army corps on a war footing may generally be taken as some 30,000 men ("Field Army Establishments. Home Defence," recently published, fixes it at 32,519 men), and with the addition of a cavalry division we arrive at a total force of some 70,000 men.

We may, therefore, place our requirements in this direction at some 75,000 men at the outside.

3. *Maintenance and Defence of our Foreign Possessions.*

There is this peculiarity with regard to our third requirement, that it is an ever present one.

Invasion may threaten us once in a century; European wars may involve us once in a generation; smaller campaigns may arise once a year or so, but the duty of maintaining our foreign garrisons in a state of efficiency continues from day to day, knows of no inter-

mittence, and suffers no relaxation. For this reason it constitutes our most pressing obligation, and for others it forms the most difficult of all to satisfy. I have already hinted at some of the difficulties in this direction, and there are others no less weighty.

Not only must we employ a comparatively *long* period of service, on account of the distance of our colonies from our recruiting ground—the United Kingdom—while the necessity for a Reserve pulls us towards short service, but the difference in climate between our colonies and the mother country obliges us to send only men of a certain age to most of our foreign possessions, and especially to India.

And owing to the absence of compulsory service we must recruit young in order to get recruits at all; older men have settled down in civil life and cannot be tempted to leave it. Here at once we find ourselves on the horns of a double dilemma. On the one hand, short service fights against long service; on the other, young recruits are opposed by the necessity for comparatively old soldiers.

And with this difficulty of our foreign garrisons comes the complication caused by the growth of our Colonial Empire, and the consequent necessity for larger garrisons abroad, while the United Kingdom—the source of supply—has not grown in population at quite the same rate.

This growth is well shown in Table B, which gives the area and population of the United Kingdom, the colonies, and India, in 1871 and 1891, and also shows the number of British troops stationed at home and abroad in those years.

I need not comment here upon this table; it contains a statement of the one great difficulty we now have to contend with.

The task of elaborating a system which will not only provide troops for the defence of a ring fence such as Great Britain, but also find garrisons for a far larger empire beyond the seas, and requiring an army under different conditions, is no easy one in itself. It is complicated by the conditions with which it is surrounded, some of which I have called attention to.

The number of officers, non-commissioned officers, and men we now maintain abroad is almost exactly one-half of our whole force in peace, being 104,839 to 104,860 at home. (Average figures for 1891, Army Annual Return.)

Perhaps a more just idea of our strength at home and abroad, and its variation in the last twenty years, is to be gained from Table C, which gives the average numbers of non-commissioned officers and men only, from 1871 to 1891. (Army Annual Returns.)

It will be observed that, whereas up to 1878 we rarely had more than 84,000 men abroad, since 1884 we have never fallen below 99,000, and thus the percentage serving abroad, which in 1871, was 45, has now risen to just over 50, while for eight consecutive years—1879 to 1886—we had each year more men abroad than we had at home.

The significance of this state of affairs will be appreciated later when we discuss the means of maintaining our foreign garrisons. At present we are only concerned with the question of the numbers.

What these numbers should be depends, to a considerable extent,

on the troops of which they are composed. There are, as I have said, three methods of garrisoning our foreign possessions—

1st. By employing a local army, recruited locally.

2nd. By means of a British force serving alike at home and abroad.

3rd. By means of a British force serving only abroad.

We could scarcely hold India, for instance, by a native or locally recruited force alone. Some British troops are certainly required, and the question is, should they form part of one universal army alike at home and abroad, or should they constitute a separate army for India only?

The experiment of a separate British force for India has been tried, and is generally held to have been unsuccessful, and for upwards of thirty years the British troops in India have formed part of the home army temporarily quartered in India.

Most authorities are against a local British army for India, and the evidence given before the Committee of which Lord Wantage was president is very strong on this point.

The Commander-in-Chief, Lord Wolseley, Sir Redvers Buller, Sir Evelyn Wood, and General Rocke, the late Inspector-General of Recruiting, all spoke against such a system, as may be seen by reference to the answers to Questions 208, 210, 395, 749, 1,429, 2,053, 2,234, 4,604, and 4,607.

And to these high authorities may be added Lord Roberts; *vide* his letter to Sir Charles Dilke, published in the "Morning Post" of July 25, 1892.

All considerations—those of discipline, efficiency, health, popularity, and economy—seem, therefore, to make a local British force for India unadvisable.

I come then to the conclusion that the native army must be supplemented by a British force not specially enlisted for Indian service, but being part of the British army, liable for home, Indian, and colonial service. Having determined on the constitution of the force, we now have to decide upon its numbers.

The 1889 Prize Essay of the United Service Institution of India, by Captain Duff, Bengal Native Infantry, contains an interesting account of the numbers of British and native soldiers maintained in India at various periods during the last hundred years. I summarize it here, and add to it the numbers now maintained there.

Year.	British troops.	Native troops.	Proportion of British to native troops.
1794	16,000	82,000	1 to 5
1808	24,500	154,500	1 to 6·3
1856 ¹	39,375	214,985	1 to 5·4
1878	60,241	135,000	1 to 2·2
1887 ²	70,552	126,573	1 to 1·8
1891	72,288	150,000 (about)	1 to 2

The increased proportion of British troops since the Mutiny is significant. In a valuable paper on the "Defence of India" (published in the "Journal of the Royal United Service Institution" in 1890),

¹ Before the Mutiny.

² Latest figures available at time Captain Duff wrote.

Colonel Bell, *V.C.*, late Chief of the Intelligence Department of India, summed up the number of troops required for the defence of India from invasion from the north-west under two sets of circumstances. He considered that, with a friendly Afghanistan whose troops would fight for us, we should require some 75,000 troops (apparently composed of equal parts of British and native corps), in addition to some 20,000 Afghans. Were the Afghans unfriendly he considered that we should require 135,000 British and native troops in the field, with an Indian garrison of another 100,000 men, or some 230,000 in all.

But, should Afghanistan be not only unfriendly but be a Russian province and have been so for some years, and should we fight on the Indus south of the Himalayas, he would place the force necessary to preserve us from invasion at no less than 660,000 men.

As the latter case is scarcely likely to arise, and as in this essay I am considering the present state of affairs, we may dismiss this latter case from our consideration.

Estimates of the numbers required to protect India from invasion can, of course, be only approximate, and must depend largely upon the person submitting them; but as Colonel Bell's views may, from his former position in the Indian Intelligence Department, be taken as more or less representative of official opinion formed upon the best information, I have quoted them here, and I propose to adopt them rather than advance any numbers of my own, which could only be founded on opinions derived from no special knowledge.

The estimate of numbers may have increased in the last year or two, and if we fix the force necessary for war at 250,000 British and native troops, we shall probably have stated our requirements. That is, we require for war some 30,000 men more than we maintain in India in peace, and these 30,000 should be British troops.

The numbers of the peace garrison would seem to be adequate, and Sir Charles Dilke, in his book, "Imperial Defence," p. 118, says: "The Indian army is sufficient for the peace requirements of India." We have also certain reserves in India, in the shape of certain of the forces of the native princes, placed by them at our disposal, and now in process of organization by us; and also certain European and Eurasian Volunteers. These altogether amount, I believe, to some 40,000 men.

Could we, therefore, on the outbreak of war, reinforce India with some 25,000 good troops she should be able to resist any invader.

Turning to the case of our colonial possessions we find that they group themselves under two heads—those garrisoned wholly or in part by British troops, and those in which no British troops are quartered. The garrisons maintained in peace time in the first of these are probably amply sufficient; they would, however, require reinforcing in the event of a big war, especially if in proximity to the seat of it.

As regards such colonies as Australia, Canada, and New Zealand, which in peace are self-supporting in the matter of troops, they might in war require military as well as naval assistance, but probably on no very large scale.

Were it necessary to reinforce them, it could probably be done at the expense of some other part of our Empire, since there could scarcely exist any Power or even combination of Powers capable at one and the same time of threatening us with invasion at home, war in India, and a descent in force on our other colonies.

In the last Naval Prize Essay of this Institution—that for 1891—Captain Craigie deals with the question of the number of troops we should require to hold our foreign ports in India and the colonies.

The chief Indian ports, including Aden and Perim, he would garrison with 5,500 men; to the Australian defences he assigns only 3,700; and to Canada, 5,100; while certain minor places, such as Ascension, St. Helena, Labuan, &c., he would hold with 1,600 marines.

For our other important ports—Malta, Gibraltar, and the like—he tells off 22,400 men, and it will be found that the present peace strength of their garrisons in most instances is in excess of his estimate.

I come, therefore, to the conclusion that the reserves I have already named as required for protection from invasion, and for participation in European campaigns, and also for the strengthening of India, should be sufficient also to provide for reinforcements for our colonies, since the three foregoing contingencies would not all have to be met at the same time as an attack on our colonies.

4. *Provision for Minor (Non-European) Campaigns.*

We now come to the last of our four requirements—a force with which to take part in smaller campaigns—not in Europe. It is, in some respects, the easiest to meet, since the provision of troops for any of the other three is almost certain to meet our requirements in this direction. But, as we should scarcely embark in any minor campaign of importance when threatened with invasion or when taking part in a European war, we need not trouble to provide a force for such minor campaigns in addition to the forces required to resist invasion or to make war in Europe. But undoubtedly we must provide for small campaigns in addition to, and without interfering with, our Indian and colonial reliefs, and thus it is necessary to fix the force which should be sufficient for such a contingency.

Without examining all our recent minor campaigns, which of late years have been very numerous, I think we may assume that a force of 25,000 men would be the utmost we should require to employ for such purposes.

Very often, of course, a sufficient force can be got together by temporarily taking some troops from our home and colonial garrisons without for the moment replacing them, and by adding some of the household troops, which, under ordinary circumstances, do not go outside the United Kingdom; but for our largest minor wars more than this is necessary. A force of 25,000 men of all arms would, however, more than suffice to meet every want.

Summary of our Imperial Needs.

Our requirements, in numbers, as I have stated them, are as follows:—

1. 150,000 Regulars and 250,000 auxiliaries ;
2. 75,000 Regulars ;
3. 100,000 Regulars at home and 100,000 abroad ;
4. 25,000 Regulars ;

in addition to our present local or native Indian and colonial forces.

It is obvious that we should not require to provide all these at any one time. Invasion of England would prevent us from participation in an European war or a minor campaign, and the numbers under heads 2 and 4 would not, therefore, be required at the same time as those under head 1.

But while resisting invasion we might require to strengthen our colonies or India with 25,000 men, thus making our total required numbers under head 1, 175,000 Regulars, or 75,000 more than the peace strength.

If fighting in Europe (head 2) we might require to reinforce India with 25,000 men; hence a required number of 100,000 men above our peace strength. But 25,000 of these might be taken from our present home garrison of 100,000, their places being taken by Militia. Hence a total addition of 75,000 under head 2.

Under head 4 we should not require any men if engaged in resisting invasion or fighting in Europe. The numbers under head 3 are those now maintained. No additional strength is wanted, but the quality must be sufficiently good, and the organization must admit of proper Indian and colonial reliefs. It therefore appears that we want a force of 75,000 men as our utmost addition to our present peace strength. But, as in that peace strength some 25,000 recruits are either too young or too insufficiently trained for war, we should not count on them; and, therefore, require 100,000 men as a reserve force to be called up for war in Europe or for resistance to invasion.

The 25,000 required under head 4 could be obtained by calling out part of the Reserve, if necessary.

I therefore thus summarize our forces as required to meet our Imperial needs:—

100,000 Regulars at home in peace.

100,000 Regulars abroad in peace.

100,000 Regular Reserve for war.

250,000 auxiliaries for home defence.

The present local and native forces in India and the colonies.

So much for numbers.

As regards quality, these men should not be below the average—physically—of the nation. Sir William Aitken in his "Growth of the Recruit" observes that most modern nations recruit from men one or two inches *below* their average. We, with our smaller forces, should be able to recruit the average Englishman. As to age, our war army, that is, the peace army *minus* its latest recruits and *plus* its Reserves, should be about the age named by the Report of Mortality in the Crimea as the best—a statement in which most authorities at home and abroad concur.

"The soldiers physically most efficient for service in the field are those ranging between 25 and 30 years of age, and next in efficiency

ought to be considered men 2 or 3 years under 25, or 2 or 3 years above 30 years of age."

A third point our organization should satisfy is rapidity of mobilization, or the act of passing from a peace to a war strength, especially with regard to troops requiring to be sent abroad.

Imperial needs therefore require of us:—1st, a peace strength of some 200,000 Regular troops—half at home and half abroad—of which the home troops shall not contain too many young and untrained men, and the troops abroad shall be composed of men of the necessary age and service; 2nd, a trained Reserve of from 75,000 to 100,000 men who shall not have been so long away from the colours as to have forgotten their training, nor to be too old for war; 3rd, auxiliary forces to the number of at least 250,000 for home defence; and 4th, local and native troops of the present strength (see Table K), and with much their existing organization.

PART III.—THE ORGANIZATION BEST ADAPTED TO MEET THEM.

I have dwelt at some length upon the question of what our Imperial needs are, because it is obviously impossible to frame an organization to meet them, unless we are thoroughly satisfied as to their nature.

And it has always seemed to me that these needs are but very dimly understood, and their difference from those of other countries but little appreciated. It is this, no doubt, which causes the public, and even the army, to take such very different views of the proper organization of our military forces.

And if I needed any further justification for dwelling on the needs of the Empire, I might find it in the fact that the foregoing consideration has to a very great extent suggested the way in which these needs should be met.

It is evident that our sea frontier restricts the numbers we require to guard it, and allows of auxiliary troops forming part of these numbers. That, at least, is the conclusion come to by the military authorities, not because they have no regular troops available, but because they prefer to employ the Regulars in other ways. And that these Regulars are sufficient for their purpose is shown by the fact that certain units have not been absorbed either in the coast defences or the field army, as is disclosed by the "Regulations for Mobilization for Home Defence, Appendix G."

We see, then, that our coast frontier is so efficient a protection against, or rather a hindrance to invasion that we not only require a far smaller force to safeguard it than other nations with land frontiers require for their defence, but that we can form a large portion of this force from our auxiliary forces.

Another fact at which we have arrived is that all British forces employed as foreign garrisons must be enlisted for a comparatively long period of service; that is, a long period as compared with forces employed solely for home defence.

A third point is that we must have a reserve of seasoned soldiers. This will be made still more apparent presently. And a further point

is that the British forces in India should not be local ones. We have thus already fixed the main outlines of our organization; it remains here to complete its details.

The system known as that of short service and reserves, as opposed to that of long service and no reserves has, after twenty years of controversy, finally made good its footing in this country.

Its position may indeed be held to be assured since the publication of the Report of Lord Wantage's Committee. That document says (para. 10):—

"The whole weight of the evidence has fully sustained the conviction that the question of long service, in the common acceptance of the term, as opposed to short service, is not now open to argument;" and it continues to speak of "the absolute necessity, under the conditions of modern warfare, for such a system as will permit of the rapid expansion for war, and reinforcement of an army in the field by an efficient Reserve. . . . This can best be provided by a short service system."

To make quite clear the difference between the two systems, and the advantages of the present one, it may be as well to review as briefly as possible the general features of each.

For two reasons the army in peace has always been maintained at as low a strength as possible. At first the fear of a standing army and the menace it constituted to the nation caused the numbers in peace to be strictly watched, and, although that reason can no longer be said to exist, the second reason—that of economy—still prevails. On the outbreak of war a much larger force was suddenly required, and was very difficult to obtain. Recourse was had to large bounties to tempt an increased number of men to enlist, but even then these men were civilians, not trained soldiers, and for some months were unfit for war. The fluctuations in our strength caused by very small peace establishments may be seen from the fact that whereas in 1698 we had only 19,000 troops in Great Britain and Ireland, in 1711 we had a large force of over 200,000 men, mostly foreigners. In 1713 the force in Great Britain was only 8,000 men.

From 1740 to the close of the last century the numbers maintained at home varied as follows:—

1740	28,852	1763	17,536
1748	49,939	1783	54,678
1749	18,857	1784	17,483
1762	67,776		

(Clode's "History of the Forces of the Crown.")

It is evident that with a small peace establishment and no reserves, a great war found us quite unprepared, and that the longer it lasted the worse our state became.

To supply the deficit we had recourse to auxiliary troops, and this led to the creation of a Volunteer force.

Clode says, vol. i, p. 311, "The early history of the Volunteer force is to be traced in every national emergency."

At first this Volunteer force was created only when war threatened,

but in time it was thought expedient to maintain it permanently, and then Parliamentary sanction for its existence became necessary.

"The foundation of the present Volunteer system was laid in the year 1802." (Clode, vol. i, p. 312.) Certain Acts were then passed in consequence of a dread of invasion, and these created a considerable force of some 263,000 men; but as all who enrolled themselves as Volunteers were exempted from a kind of universal liability to serve which at that time was introduced, the market from which the Regular Army was recruited was much diminished, and Mr. Windham declared that these measures had not only failed to create an army, but had rendered it impossible to raise one. One of these Acts raised 46,020 men between July, 1803, and July, 1804, at a cost of 1,145,949*l.* for bounties alone, or an average of nearly 25*l.* a man, which seems excessive when we reflect that these men were enlisted only for service in the United Kingdom. In 1806, 1807, and 1808 Mr. Windham and Lord Castlereagh introduced various measures which had the object of creating a large Reserve force for service at home.

As is well known, the present Volunteer force came into existence in 1859, and, as Clode points out (vol. i, p. 334), it is a purely voluntary force, which its predecessors were not; is drawn from a higher class; and, being capable of being sent to any part of Great Britain, is more "national" and less "local" than the Volunteer force at the commencement of the century.

The first statutes relating to the Militia date back as far as 1285 and 1306, but its more modern organization was introduced about 1757. It was then rendered liable to embodiment "in case of actual invasion, or upon imminent danger thereof, or in case of rebellion," and was called out in accordance with this authority for four years in 1759, and for five years in 1778. In 1792 commenced a long period of embodiment, ending only in 1816. In 1813 the innovation was made of permitting it to serve abroad, and three battalions took part in the Peninsular War; while in 1815 a Bill was passed authorizing the Crown to keep it embodied after the conclusion of a war.

Thus the nature of this Constitutional force became much changed. In 1854 ten battalions of Militia, out of fifty volunteering, were sent as garrisons to the Mediterranean. In 1881 the Militia became closely associated with the Regular Army by being constituted the 3rd and 4th battalions of the Regular territorial regiments, with the same uniform and badges. The last embodiment took place in 1885.

Besides thus acting bodily as a Reserve for the Regular Army, the Militia has often acted as a source of supply in the way of recruits.

In 1799 some 52,000 Militiamen volunteered for the Regular Army, and between 1805 and 1814 large numbers passed from one force to the other. (See Table E.)

During the Crimean War about 32,000 men went from the Militia to the army, and now large and increasing numbers enlist from the Militia in the Regular forces.

As an instance of the straits to which the old system reduced us, we may take the facts shown in Table E, which I have compiled from information given in an appendix by Mr. Clode to the Report of the

Committee of which Colonel Stanley (now Lord Stanley) was president, and which sat in 1877.

This remarkable table tells a very melancholy tale. It shows that for the first fifteen years of this century we could not, in spite of our most strenuous efforts, supply our army with sufficient men.

What these efforts were may be imagined when we see that, at times, we paid bounties of 16 guineas a head for men of thirty-five years of age and 5 ft. 4 in. high, and for growing lads of seventeen years old and 5 ft. 3 in. in height. Even boys of sixteen and 5 ft. in height were worth several pounds in bounty alone, not to mention levy money for men and lads, amounting at some periods to as much as 23*l*.

For general service the age limits at one time were from sixteen to forty, and the height as low as 5 ft. Yet in 1807 we were 42,000 men below our establishment, and from that year to 1815 were never within 18,000 men of our requirements.

It may perhaps be imagined that this state of things could only have occurred some time ago, and that we have long since altered all that. But we have comparatively recent instances of our shortcomings in this respect. The establishment of our army on January 1, 1854, was 124,801, and we then "wanted to complete" some 2,337 men.

The Crimean War caused our establishment to rise to 189,956 by January 1, 1855, and, although we enlisted as many as 31,620 recruits in 1854, and lowered the standard from 5 ft. 6 in. to 5 ft. 4 in. to get them, we were, at the end of the year, no less than 46,658 men below the authorized establishment.

In 1855 we obtained 32,119 recruits, but as our establishment was again raised (to 205,808), the deficiency on January 1, 1856, amounted to no less than 50,402 men.

The reduction of the establishment to 144,518 enabled us in 1856 to raise the standard to 5 ft. 6 in., and we found ourselves with 5,120 men too many on January 1, 1857.

Thus in 1854, 1855, and 1856, when we urgently needed men, we were always short of them, sometimes by as much as 50,000; but in 1857, when they were no longer required, we had more than we knew what to do with. A more painful satire on a military system cannot be imagined.

The same thing occurred a few months later, in the Mutiny, when, in spite of a standard lowered 3 in. (to 5 ft. 3 in.), and the consequent enlistment in 1858 of 41,713 men for the infantry, we failed to obtain the authorized numbers until the campaign was over and the Mutiny suppressed.

The Prince Consort, in a very able memorandum to Lord Aberdeen, written in 1855, says, "The difficulty, if not utter impossibility, of creating the whole machinery which constitutes an army at the moment when this army is to take the field and meet the enemy, induces a lavish and absurd expenditure." ("Life," by Sir T. Martin, vol. iii, p. 191.)

Whether these painful experiences were the cause of the enquiries of 1861 and 1866, I am unable to say, but doubtless they prepared the way for the reform introduced in 1871. This reform consisted of

the adoption of a shortened term of service in the ranks which enabled us to pass through them annually a certain number of men into reserve, which men remained in reserve for a certain period, during which they were available in case of national emergency.

This Reserve, which does not detract from the numbers serving in the ranks, now amounts to over 70,000 men, and adds this additional number to our forces available for war. There is no need to enter into the details of the system thus adopted, nor the minor alterations it has undergone since Mr. Cardwell, afterwards Lord Cardwell, introduced it some twenty-one years ago. It will suffice to say that in principle, at least, it provided for the strain of war without in any way necessarily raising either the numbers employed in peace, or the price paid for them.

As a matter of fact, the price has considerably diminished, from various causes too numerous and complicated to mention.

Actuarial War Office Report, January, 1889, No. 392, states that the normal saving per annum effected by the substitution of short for long service is 21·71 per cent. for Great Britain, and 47·2 per cent. for India. This Report I have not seen, as it is not, I believe, made public, but it is referred to and the above figures are quoted from it in an article by General Sir John Adye in the "Nineteenth Century," for September, 1892.

The great result of the short service system introduced in our army some twenty years ago, but previously adopted by every other Great Power, has, therefore, been the creation of a reserve of men, all of whom have passed through the ranks of the Regular army, and are in the prime of life. This Reserve, on the 1st of January, 1892, amounted to 68,421 men. It has since risen to over 70,000, and by the end of the present year is, I understand, expected to approach 80,000 men. Of the total of 68,421 some 46,039 were, on January 1, 1892, under thirty years of age, and 22,273 were between thirty and thirty-five.

As all of these men have served for a considerable time in the ranks, the greater number of them for seven years, and as none have been very long away from the colours (most of them less than five years) it is evident that they form an efficient and valuable force with which to reinforce our peace strength in case of war. And that they would be forthcoming in the event of war is borne out by the fact that on the three chief occasions on which they have been wholly or partly called out, viz., in April, 1878, in July, 1882, and in 1890-91, 94 per cent. was the lowest proportion responding, and 90 per cent. the smallest number sent to their corps after medical inspection. (Lord Wantage's Report.)

It is evident, then, that as one result of the short service system, we have now a reserve of trained men in the prime of life on which we can rely to provide something like 70,000 men.

The creation of a reserve is not, however, the only object to be aimed at. Should its creation unduly prejudice the active army, it would indeed be dearly gained.

The two directions in which the introduction of short service affects

the army are in respect of the quantity and the quality of its recruits. It must be evident that an army in which the average service of the men composing it is, say, ten years, will require something like double the number of recruits required by an army of equal strength the average service in which is twenty years, and half the number required by an army with an average service of five years. (This statement is not, of course, an exact one, since it does not take into account the varying rates of death and invaliding at different ages.)

When, therefore, men enlisted for twelve years with a possibility of continuance to twenty-one years or more, fewer recruits were annually required to maintain a given strength than when the army is, as now, chiefly composed of men enlisted for a first term of seven years, with a possibility of extension to twelve years. One effect of the introduction of short service, therefore, has been to increase very largely the number of recruits required to maintain the army at its proper strength, and the fact that that strength has gradually increased has added to the demand. As against this we may put the diminished loss from desertion, discharge for misconduct, death, and invaliding which is observable of recent years.

Table D shows the establishment, the strength, the number of recruits finally joining, and the number "wanting to complete," or "supernumerary," in each year from 1862 to 1892. The ten years 1862 to 1871 were the last ten years of long service, and, as we had no serious wars in that decade, their results may be taken as fairly typical of that system.

From 1872 to 1881 the short service system began to be felt, but, of course, its full effect could not be experienced while the army was still so largely composed of long service men, and indeed these effects are only now beginning to be fully realized.

But the decade 1882 to 1891 saw the short service system fairly established, and we can safely draw certain conclusions from its results.

The average annual number of recruits obtained from 1862 to 1871 was 14,778, and the average number annually "wanting to complete" was 4,017.

We may, therefore, say that the number annually required was 18,795. In the next decade the average number obtained yearly was 23,492, and there was an average annual superfluity of 760, giving an average annual requirement of 22,732.

In the ten years ending in 1891, the number of recruits obtained averaged 32,225 per annum, the deficit was 2,814, and, therefore, the annual demand was 35,039. (Army Annual Returns.)

In 1892, the Inspector-General of Recruiting estimated the requirements at little short of 40,000, which number seems likely to be obtained.

It would, therefore, seem that the introduction of short service, which has practically diminished the average period of service in the ranks by at least one-half, has naturally increased the number of recruits required, in much the same proportion; that is, where formerly we wanted one man we now want two.

And from the figures I have given, it is apparent that we now

much more nearly satisfy our requirements than we used to do, since from 1862 to 1871 we only obtained on an average 14,778 per annum, where we wanted 18,795; whereas, from 1882 to 1891, we obtained 32,225, where we required 35,039.

I do not mean to say that these figures can be taken to represent the absolute state of supply and demand, but they give us at least a basis of comparison, and they, undoubtedly, point to the fact that if under the short-service system we require more recruits than we formerly did, we certainly obtain more. And the supply seems to be increasing and not diminishing or remaining stationary. The results of the recruiting of the first seven months of 1892 have lately been made public in a special Return issued by the Inspector-General of Recruiting, and show that, if the demand in 1892 is unusually large, so is the supply. Upwards of 4,000 more recruits have joined the army in these seven months than joined in the corresponding period in 1891, and if the same rate of supply is maintained, the unusually large demand will be more than met.

So much for the question of quantity as affected by the introduction of short service.

Now as regards the equally important matter of quality.

With the introduction of short service came the abolition of bounties, and thus, with the necessity for an increased supply of recruits, we abolished one of the inducements to enlist.

It may be thought that the numbers would therefore show a falling off, but the figures I have just given show that, on the contrary, they steadily increased. This must be chiefly ascribed to the greater popularity of a short term of service.

But even in face of this greater popularity, we could hardly expect to get about twice as many recruits of the same age and stature as we formerly with difficulty obtained.

As a matter of fact the increased number could not be obtained at the high physical standards then established.

Table F shows the physical standards with which recruits have had to comply from the year 1868 up to the present time. It will be observed that for the first few years the standard of height rarely fell below 5 ft. 6 in., whereas now it is 5 ft. 4 in., and, in special cases, an inch less. The increased and increasing number annually required has caused this lowering of the standard. This, at first sight, seems a serious matter, but further examination reveals certain satisfactory features.

In the first place a comparison of our present standards with those of other armies shows that we are still considerably better than they are in this respect. (See Table G, compiled from Lord Wantage's Committee Report.) And although it may be impossible to compare our army with others in many ways, such as cost, there can be no doubt that as regards the physique of the individual soldier the comparison is a fair one. And not only does the soldier compare favourably with the soldiers of other armies; he compares favourably with the average inhabitant of the United Kingdom.

I base this assertion on some remarkable figures given by various

authorities, but notably by the late Sir William Aitken in his excellent work, "The Growth of the Recruit."

I would call particular attention to Table H, which I have copied from Sir William Aitken's work, and which he in his turn took from a work of Mr. Charles Roberts, who compiled it from his own observations and measurements.

Two conclusions may be drawn from these figures: first, that the body increases in size and weight up to at least the age of 23; second, that there is a great difference in the size and weight of the two classes into which he divides the nation.

As we draw our recruits almost entirely from the second class, *i.e.*, the working, or non-favoured class, and as this class forms the greater part of the population of the United Kingdom, it is to its figures we must look.

Now it will be observed that in this class the mean height at the age 17 to 18 is 5 ft. $4\frac{1}{2}$ in., and a year older is 5 ft. $5\frac{1}{2}$ in. Men of this age but of greater height are, therefore, men above the average height of the nation. Therefore, when in January, 1869, we fixed the minimum age at 17, and the minimum height at 5 ft. 8 in., we could only hope to obtain abnormally tall youths. The average Briton was debarred from entering the army. Whether excessively tall young men of that age are as likely to turn out healthy strong men as rather shorter youths is, I should imagine, more than doubtful.

But we could in those days afford to indulge ourselves in the matter of inches, since we wanted very few recruits.

The moment, however, that we wanted more men we were obliged to lower our standard. Thus, in 1870, in long-service days, when the Franco-German War caused us to add 20,000 men to our strength, the standard fell to 5 ft. $4\frac{1}{2}$ in. We came down, in fact, to the average man. The same thing was observable in the Peninsular and Crimean Wars, and in the Mutiny, as is shown by Table E, already quoted.

To show what I mean still more clearly, let us examine the numbers of recruits medically examined in the years 1869 and 1870, before short service was introduced. In the first year, when the minimum standard varied from 5 ft. 8 in. to 5 ft. $6\frac{1}{2}$ in., and probably averaged 5 ft. 7 in., the numbers enlisted below 5 ft. 7 in. were 8,577, and above that height were 9,172.

In 1870 the standard varied from 5 ft. 8 in. to 5 ft. $4\frac{1}{2}$ in., and the average for the year was, perhaps, about 5 ft. $5\frac{1}{2}$ in. No less than 25,930 recruits examined were this year below 5 ft. 7 in., and only 12,478 were above that height.

Thus, although in 1870 the number of men examined was more than double that in 1869, the number above 5 ft. 7 in. only rose from 9,172 to 12,478, while the number below 5 ft. 7 in. increased from 8,577 to 25,930. In fact, nearly the whole of the increased numbers came from men below 5 ft. 7 in., because the stock of available men over 5 ft. 7 in. was almost exhausted.

The same thing is observable in the age of the recruits enlisted.

In 1868, out of 12,547 recruits entering the service, about 7,000 were over 20 years of age.

In 1874, out of 19,450 recruits joining, 10,782 were under 20, and 8,668 above that age.

In 1890, 21,849 recruits were under 20, and 8,104 above 20.

The number of men entering the service above 20 years of age has, therefore, fluctuated very little in a period of more than 20 years, and under two completely different systems; but the much larger number of men now required is obtained by enlisting younger and smaller men.

We do not obtain fewer older and larger men (we obtain, if anything, more of them), but we obtain many more younger and smaller.

Now, if we obtained men smaller but not younger we should evidently be enlisting a smaller race of men; but since the average age has fallen with the average height it seems that we are in reality enlisting much the same class, but are enlisting them younger.

That is,—when these men are full grown they will be as big as their predecessors. Not only do the tables compiled by Mr. Roberts prove the growth of men of all classes up to 23 or even 25 years of age, but other authorities confirm this.

Colonel Onslow says that the average height of a British lad of 18 is from 5 ft. 5 in. to 5 ft. 8 in., and he expects a growth of from 1 to 2 in. between 19 and 25.

Drs. Lawson and Balfour expect a recruit of 18 to grow 1 in. in height, $1\frac{1}{4}$ in. in chest, and 10 lbs. in weight before reaching the age of 23. Sir William Aitken observes that in the British Service the minimum height has, as a rule, been *above* the average height of the population at the age of 18, and remarks that the greatest military nations of the modern world have gone 2 in. or more *under* the average height of the population at the recruiting age of 18, and found no disadvantage in doing so. Two authorities give the lowest stature of the Roman soldier as 5 ft. 3 in.

It would, then, appear that in days when we wanted but few recruits we obtained them of a size considerably *above* the average size of the nation, but that, now we require many more, we are obliged to enlist men of average stature.

The average recruit enlisted in 1890 (the latest year for which these particulars are available) was 19.1 years of age, 5 ft. 5.6 in. high, 120 lbs. in weight, and 33.5 in. round the chest. (Army Medical Department Annual Report.)

Were our army as large as those of the continental Powers, and did we require annually some 100,000 men or more, as they do, we should, in spite of universal service, be obliged to go some inches below the average height and size of the nation. Short service has, in fact, taken us a certain way toward conscription as far as numbers go, and has consequently brought our standards down a certain distance towards those of other armies.

The fact that the lowering of the physical standards lowers the *average* age at which recruits enter the army is evident when we reflect that it opens the army to many youths, who were always old enough to enlist, but not large enough until the standard of height was lowered.

They would no doubt have grown sufficiently to enter the service, but by that time they generally settled to other professions, and thus were lost to the army.

Thus by fixing on a height standard out of proportion to the age standard we lost many promising recruits. The fact that the average age of our recruits on enlistment has decreased does not seem to be a bad thing (except from one point of view, to which I will allude presently, and for which a remedy may be found). It is evident that if there is so much room for growth after the recruiting age of 18, the good food, regular hours, healthy conditions of life, and gymnastic and physical training a soldier enjoys must have a very beneficial effect, and this effect will be the greater the earlier these conditions commence. (*Vide* Dr. Parke's "Manual of Hygiene," and Report of Inspector-General of Recruiting, 1891.)

Statistics abound of the improvement caused by regular gymnastic training, but I will only give one instance out of many at my disposal. I take it from an appendix to the Report of the Inspector-General of Recruiting for 1891. The figures there given relate to a batch of twenty-five recruits of the 1st battalion Northamptonshire Regiment, at Aldershot, who went through a gymnastic course between the 21st October and 10th December, 1891.

Their average service at the commencement of the course was less than 3 months, their average age 19·2 years, height 5 ft. 5½ in., weight 9 stone 4 lbs., and chest girth 32½ in.

The average attendances were 34 of 1½ hours each, or 51 hours apiece. The average increase in weight was 5 lbs., and in chest development was 2½ in. One man increased as much as 10 lbs. in weight, and four increased more than 3 in. in chest development.

The average increase round the upper arm was ¾ in. These men were not exceptionally fine men, only seven were over 20 years of age, only one was over 5 ft. 7 in. in height, and only one weighed more than 10 stone. Other examples of the value of such training are given by Colonel Onslow, late Superintendent of Gymnasia at Aldershot; by Dr. Don, in a lecture delivered by him at the Royal United Service Institution in May, 1889; and in Sir William Aitken's and other works.

It would, therefore, seem that there is no physical disadvantage incurred by enlisting men rather younger than we used to do, and that we really get much the same class of men that we formerly did, but get them younger.

Lord Wantage's Committee confirm this view, for in their Report they say:—

"As having an intimate relation to, and an important bearing on, this branch of the question before them, the Committee have taken much evidence as to the class of recruit now enlisted. They have the practically unanimous opinion of all the officers examined, from the Commander-in-Chief downwards, to the effect that the fault to be found with the present recruit is his youth, and the inferior physique due to youth; given time, he develops into a thoroughly

satisfactory stamp of man; and in all other respects he will bear comparison with any class of recruits enlisted in former times."

In an army recruited by voluntary enlistment the organization must be very greatly affected by the number of recruits entering it, and that number is again affected in its turn by the age and physique which the recruits must possess. This is my excuse for dwelling at some length upon this question of physique, which not only is one of great importance for any army, but indirectly affects very deeply the organization of an army such as ours.

I have said that, were it not for one consideration, the fact that men enlist young need not trouble us. This consideration is that we must keep India and the Colonies—which absorb half our force—supplied with men, and that medical opinion is opposed to these men being less than 20 years of age. As a very large proportion of our recruits (some 70 per cent. in 1891) are less than 20 years on enlistment, our difficulty is very apparent.

The two conditions I named at the commencement of this essay as being the two in which we most differ from other countries are here in antagonism.

On the one hand, voluntary service obliges us to take our recruits young in order to get sufficient; on the other, our foreign, and especially our Indian, garrisons require comparatively old soldiers. Overcome this difficulty, reconcile these conflicting conditions, and the problem of military organization is solved.

That I am not exaggerating the importance of this question is shown by the fact that it was precisely this point that Lord Wantage's Committee were appointed to investigate.

Their instructions were to inquire into and report upon the inducements to enter the army, the conditions of service, and the advantages on discharge "with the view of ascertaining in what manner and to what extent these conditions fail to meet the requirements for drafts for India and the colonies."

If in an army in which the usual term of service in the ranks is seven years the great number of recruits enlist at 18 years of age but are not allowed to serve in one portion of the Empire until they are 20 years old, and if that portion of the Empire absorbs one-half of the army, it is quite evident that for that half of the army the length of service in that portion of the Empire is not 7, but 5 years.

The Adjutant-General to the Forces, giving evidence before Lord Wantage's Committee, said: "I think the average is about five years" (Question 110), when speaking of the average time spent in India by the average man.

This reduction for India (and in part for the colonies) of the average service from seven years to five would be sufficiently serious in itself, but it is complicated by other matters.

I have shown that we now require more recruits than we formerly did, and that in consequence we get them rather younger. That is, the average age on enlistment is younger; the *minimum* age is not changed. And I have also shown that the proportion of troops abroad is greater now than it was, and that almost exactly one-half of the

army is now abroad, where formerly the larger portion was at home.

This has two results.

In the first place, it results in most of the old soldiers being abroad and all the young ones being at home. This is disadvantageous to the army at home.

In the second place, even by sending out most of the old soldiers and retaining all the young ones, it is very difficult, and sometimes impossible, to supply the army abroad with men having the necessary qualifications.

These qualifications are for India, six months' service and 20 years of age as the lowest limits, and four years still to serve as the opposite limit. This is hard on the army abroad, and especially on that portion in India.

The case of the infantry of the line is still harder than that of the rest of the army, and to it the attention of Lord Wantage's Committee was specially directed. There are certain regiments of cavalry and infantry (the Life Guards, the Foot Guards, and certain dragoon regiments) which do not serve out of the United Kingdom as a rule. It is therefore obvious that if one-half of the army is at home and one-half abroad, but part of the army never goes abroad, the remainder must have more than one half of its strength abroad.

This is the case with the infantry of the line, which has 76 battalions abroad to 65 at home, and has, in 1892, an establishment of 69,188 rank and file abroad to one of 52,426 at home, including dépôts. (Lord Wantage's Report, para. 25.)

If the 76 battalions abroad are chiefly composed of men from 20 to 25 years of age, and the 65 battalions at home of men from 18 to 25 years of age, it is quite evident that the home battalions must be full of comparatively young, and the foreign battalions of comparatively old, men; and it is a fact that even then it is very difficult to keep the 76 battalions abroad supplied with men of the requisite age.

In fact, the drafts for battalions abroad were slightly less than were required in the trooping season of 1889-90, were 1,800 less in that of 1890-91, and in 1891-92 were expected to be 1,400 less, and but for certain makeshifts would probably have failed by 3,200. (Report of Lord Wantage's Committee, para. 20.) This has really arisen from the larger number of troops now maintained abroad, consequent on the growth of the Empire, shown in Table B.

Some twenty years ago, when the present system of linked battalions was introduced into the British Army, we had, as we have now, 141 battalions of infantry of the line, and these were formed into seventy pairs with one battalion over.

Seventy-one battalions were located abroad and seventy at home, and the home battalion of every pair had the duty of receiving, training, and despatching abroad the recruits of its linked battalion.

But in course of time the Empire required that more battalions should be sent abroad, and in place of raising fresh battalions for foreign service, some of the home battalions were sent out.

This had a double effect. Not only did it add to the strength

abroad, but it diminished the strength at home, and thus rendered doubly difficult the task of the home battalions in supplying the foreign ones with men.

Thus the difficulty of supplying the army abroad, and especially that in India, with men has arisen chiefly from two causes.

In the first place the average service for which men enlist is seven years, but the average service they spend abroad is only five years.

In the second place the numbers to be maintained abroad are now much larger in proportion to the whole than they were, being exactly one-half of the whole British army, and a good deal more than one-half of the British infantry of the line which forms the greater part of the army.

Various remedies have been suggested. It has been proposed :—

1. That India should have a separate British army.

2. That the period of service in the whole British army should be longer.

3. That men should be enlisted older.

(These all aim at correcting the first evil.)

4. That the proportion between the home and foreign infantry battalions be restored by bringing home five battalions.

5. That this be effected by raising ten new battalions, and adding them to the home strength ; or

6. By various makeshifts, such as counting Malta and Gibraltar as home stations, and bringing their garrisons on the home roster ; or bringing the Guards' battalions on to the foreign roster, &c., &c.

(These all aim at rectifying the second evil, namely, the unequal distribution of the foreign and home establishments.) There are objections to all these remedies.

As I have already stated, none of the best military authorities approve of giving a separate army to India.

To lengthen the period of service in the army to any great extent would be to destroy the reserve, to increase the estimates, to retain men in India beyond the best limits of age or service, and thus cause them to deteriorate physically, and die or become invalided in large numbers, to render the service unpopular, and, in fact, to revert to all the old evils of long service, now almost universally condemned and deliberately abandoned twenty years ago by the nation in favour of short service. To enlist men older would no doubt be an excellent thing if we could manage it, but all those who have most studied the question agree that it cannot be done without an enormous and unjustifiable expense, an expense no government would ask the country to stand, nor one it would have any chance of making acceptable.

To bring home five battalions of infantry seems quite out of the question, looking to the present strength of our foreign garrisons ; and as long as Egypt absorbs three battalions it seems quite impossible.

To raise ten new battalions for the home garrisons is expensive, and, since they are not wanted as additional strength at home but merely to put right the system, the country could scarcely be expected to stand the expense which, in pay alone, and without estimating the cost of food, barracks, clothing, &c., amounts to 20,000*l*.

per annum per battalion. (See Army Estimates, 1892-93, p. 146.) As to the various expedients suggested as makeshifts, such as bringing the Guards on to the Line roster, counting certain foreign stations as home stations, and the like, it is evident that they *are* makeshifts, and therefore do not go to the root of the disease, while, on the other hand, they would create others scarcely less pressing than the one they profess to cure.

There are, however, two methods of overcoming this difficulty, one of which is, indeed, briefly mentioned in the evidence given before Lord Wantage's Committee, but which had occurred to me before I read that evidence. It may not be a perfect cure, but it would certainly prove a partial one, and from its simplicity and inexpensiveness it should recommend itself to our military authorities.

Indian health statistics show that after eight years' service in India a man deteriorates considerably, and they also show that in point of age, a man of from 20 to 30 is better than a man over 30 years old. (See Tables I and J.)

This no doubt had something to say to the term of seven years' service adopted for our army, which is a compromise between the old long service and the very short terms of service employed on the continent. But I have shown that as far as India goes and, in a lesser degree, the colonies, the length of service spent there is on an average five to five and a half years in place of seven, and thus our army in India is maintained on a five years' and not on a seven years' term of service. And seeing that 70 per cent. of our recruits enlist under 20 years of age, and 50 per cent. of them under 19, and that it seems impossible to induce them to enlist older, it would appear to be better to face the difficulty, and to ensure for each man a possible service after 20 of seven years, by retaining rather longer those who enlist younger than 20.

By this means every man would put in seven years' effective service in the ranks; now 70 per cent. (unless they extend or prolong their service) do not serve for seven effective years, since they cannot be called properly effective, that is to say, available for service at home and abroad, for some considerable time after they enlist.

This loss of effective service is pointed out by Sir Redvers Buller in his evidence before Lord Wantage's Committee, and Lord Wolseley in his evidence says, "I think a man ought to have the power of serving in India for seven good years."

All recruits between the ages of 18 and 19, that is in their 19th year, should be enlisted for nine years with the colours; all between 19 and 20, that is in their 20th year, for eight years; and all over 20, for seven years, as now.

This would ensure every man serving for at least seven years after he attains what I may term the effective age of 20; the age, that is to say, at which he is available, as far as age is concerned, for service throughout the entire Empire. And this measure in itself would probably solve the present difficulty of finding drafts for India, since it would give an average service in that country of seven years in place of the present average of five or five and a half years. To

maintain a strength of 100,000 men abroad with an average length of service for each man of five years requires an annual supply of 20,000 men (leaving out all calculations as to loss from death, desertion, invaliding, &c.).

To maintain the same strength with an average of seven years' service per man requires, in the same way, an annual supply of 14,285 men, or a diminished draft of 5,715; that is, of 5·7 per cent. of the whole force, and 28·57 of the annual draft.

Even if we take the average service abroad now as six years, we should diminish our annual draft by 2,381 men, or 11·4 per cent. of the present draft.

These figures cannot, of course, be accepted as showing the actual diminution of the draft my proposal would cause, but they afford a fair idea of the ease it would afford the system. The objections likely to be raised to it are: 1st, that it would go some way towards re-introducing long service; 2nd, that it would diminish the Reserve; 3rd, that it might cause a decrease in the number of recruits coming forward; and 4th, that it might make it more difficult for men to find employment on leaving the ranks.

I do not think any of these objections, serious as they may be in themselves, are of any real account in this case. As regards the first, the rather long period for which part of the army would serve would, no doubt, give a rather longer average service per man, but the increase would be slight. Taking the infantry recruits for 1891 who enlisted between the ages of 18 and 25 (that is, excluding trumpeters and boys), and assuming that those between 18 and 19 enlisted for nine years, those from 19 to 20 for eight years, and the rest for seven years, I find that the average service per man (supposing every man to complete his term) amounts to 8·27 years, in place of 7.

This does not take us very far back on the road to long service.

And, as I would prohibit any but non-commissioned officers from re-engaging or extending their service, this would reduce the average length of service in the ranks, or rather would not increase it, as is now the case. In 1891, 1,933 men of the infantry extended their service to twelve years, many of whom, no doubt, were non-commissioned officers, but some of whom were private soldiers.

And it must be borne in mind that the term of seven years' service has no special virtue, and, even if it had, that would be no reason why we should not alter it did circumstances make it necessary; for a too rigid system is to be deprecated for our army, where, owing to voluntary enlistment, we must suit our system to the country; in other countries the nation has to suit itself to the army system. And I maintain that the circumstances have changed, inasmuch as we now have 17,000 infantry soldiers abroad more than we have at home, whereas when the present system was introduced we had equal numbers at home and abroad. Having increased our infantry of the line from 104,000 to 121,000 men, and having placed the entire increase abroad, a slight increase in the average length of service of the whole may become necessary, and, if so, should be effected.

With regard to the diminution of the Reserve, it would not be a

very great one. Not being an actuary, I am unable to calculate it, even approximately; but, as at the same time that I would give a seven years' service over twenty to every man, I would also insist on every man going to the Reserve after his first term expired (except non-commissioned officers), I do not think the general effect on the numbers of the Reserve would be perceptible.

The number of private soldiers serving on January 1, 1892, who, originally enlisting for short service, *i.e.*, for periods of three or seven years in the ranks, *extended* their original engagements, was 9,948, while 4,963 more privates had *re-engaged*. Were my proposal adopted, this number would be added to the Reserve, and should more than counterbalance the diminution caused in that body by a rather longer average service for men enlisting under twenty. Nor do I think this would greatly add to the difficulty of supplying the drafts, since that difficulty is not one of numbers, but of age. Moreover, the further measure I shall presently consider would obviate any difficulty on this score.

Of course, if the total of a man's service in ranks and Reserve is taken as 12 years and must not be more, men enlisting for 9 and 8 years respectively would only serve 3 and 4 years in the Reserve. This, however, is no part of my proposition. I see no more particular virtue in 12 years for ranks and Reserve than I do in 7 years for ranks alone.

If all men enlisted at the same age there might be something to say for it, but they do not; and why should a man enlisted at 18 leave the Reserve and complete his military liability at 30, when another enlisted at 25 continues to be liable for service up to 37 years of age? This seems to me an anomaly in the present system, which I would remove by allowing all men to continue in the Reserve up to the age of 40.

The Reserve might for this purpose be divided into two or more sections, and, in passing from one to the other (which a man could only do voluntarily), he should be medically inspected and, if pronounced fit, should undergo a short training. All men, whether enlisted for 9, 8, or 7 years, should serve 5 years in the Reserve on completion of their term in the ranks, that is, by far the greater part of them would go to Reserve at 27 and remain in it up to 32 years of age. They might then re-engage for, say, another 4 years, and, after that, for a final period of 4 years. Both these re-engagements should be optional.

I am aware that a supplementary Reserve, more or less of this nature, already exists, but it only appears to contain 9,000 men. It should be increased; and the same pay given to it as to the other classes of the Reserve.

As it is now, a man enlisting at 25 continues in the ranks or the Reserve up to the age of 37, so that there cannot be much objection to my proposal on the score of age, especially as most continental armies retain their Reservists to the age of 40 or upwards.

As to absence from the ranks, the Guards Reservists who leave after 3 years' service in the ranks remain for 9 in the Reserve under

present arrangements, and I would ensure, for every Reserveman, a training at least once in his first 5 years in Reserve, and another each time he re-engaged. When the Reserve were called out, the first section, that is containing those last passed from the army, should be first called, and the others in succession, as might be necessary.

By these means the Reserve might, I think, be increased to 100,000 men, although I am, of course, unable to calculate exactly to what size it would grow.

As it is now something like 80,000 strong, and as the greater part of it is composed of men between 25 and 35 (43,039 under 30, and 22,273 between 30 and 35 on January 1, 1892), I think that were men, if fit and active, retained up to the age of 40 my estimate of 100,000 is under rather than over the mark.

The next objection I have named is that a rather long term of service for men under 20 might tend to diminish the numbers coming forward for enlistment. I do not think this will be found to be the case. A youth of 18 or 19, who means to enlist, would not be deterred by the fact that he would have to serve 8 or 9 years in place of 7. As a matter of fact, in nine cases out of ten, he neither knows nor cares for how long he is enlisting, provided it is not for life or for some really lengthy period.

Witnesses examined before Lord Wantage's Committee, many of them private soldiers or non-commissioned officers, stated that men on enlisting are very little concerned as to the exact period they enlist for, but enter the army, as a rule, because they are out of work, or because they have a liking for a soldier's life. At 18 a would-be recruit cares little whether his period of service is to be 7 or 9 years, his chief anxiety is to enlist.

But if a rather longer term of service for men below 20 did slightly affect the numbers entering the army, it would probably be counterbalanced by the slight reduction in numbers wanted, caused by the rather longer term of service. If, however, extra inducements to enlist were still required, they should be granted.

There remains the objection that a man enlisting at 18 and leaving the ranks at 27 would find it more difficult to get employment than a man enlisted, as now, at 18 and leaving at 25. This, also, I do not think is founded on fact.

If it is the age of the man that is against him, how is it that men now enlisting between the ages of 20 and 25 and leaving between the ages of 27 and 32 find it possible to get employment? If, again, it is the fact that absence for nine years from civil life in place of seven is the difficulty, too much stress may easily be laid upon those two extra years from 25 to 27. Is it really supposed that an employer who would accept a man who enlisted at 18 and left at 25 will reject a man who enlisted at 18 and left at 27? I think this is a fallacy. No doubt, under a long-service system, a man having served for 21 or even 12 years found it hard to find employment on return to civil life; but there is a great difference between 9 and 21. Here again, however, if the difficulty is found to exist of finding employment for men who leave the ranks at 27 years of age, after 9

years' service, it is removable; and an organization by which able-bodied men of 27—who have learnt discipline and obedience in 9 years' soldiering—are found adequate employment in civil life should not be beyond our resources to create.

I have said that there are two methods by which, in my opinion, the draft difficulty might be solved. I have named one, but if it were not found practicable, or if it failed to entirely remove the difficulty (and this point none but an actuary could accurately determine), there still remains the other.

This second measure should certainly be adopted in any case. It is a matter entirely of arrangement, and one that is necessary in order to place our military organization on a straightforward and business-like basis.

What would be said of a house of business which, having large transactions involving a fluctuating expenditure—which could, to a great extent, be foreseen—made no provision to meet this expenditure, but lived from day to day, content to attempt to meet each demand as it arose, not from a reserve fund, not from carefully accumulated revenue, but by extra exertions and evident makeshifts, entered upon only when the demand presented itself? Such a business could not exist a week.

To the level of such a business is the military organization of this country reduced by the rigid and unpractical manner in which Parliament controls the numbers and expenditure of the army. Seeing that the average length of service in the ranks is about seven years, it is evident that if, say in 1892, a larger number of men than is usual enters the army, in 1899 a larger number than usual will leave it, unless unforeseen circumstances arise, or some radical change of system occurs.

There are many circumstances which may affect the demand for men in a particular year: a war, an increased establishment, an unhealthy season in India, or an epidemic of crime or desertion. Some of these matters it is, of course, impossible to foresee; others, and they the more important ones, can be foretold with sufficient accuracy. But owing to the present system by which Parliament fixes annually the number of men to be maintained, which number is not merely a general guide, but must not on any account, or at any time, be exceeded, it is almost impossible to make adequate provision for a clearly foreseen occurrence, while an unforeseen one is sufficient to throw the whole machinery of supply completely out of gear.

I will give an instance.

Some European complication or some minor campaign obliges us to call out a part of the Reserve. The moment these men join the colours recruiting is suspended, because by their addition we are already beyond the strength laid down by Parliament, and we are, therefore, not at liberty to continue to enlist. The necessity for the Reserve passes by, they return to civil life, and recruiting once more goes forward. But now we have got considerable leeway to make up and, if the Reserves have been out for long, we may be quite certain that by the end of the year we shall certainly not have obtained the

required quota of recruits, since for several weeks recruiting was suspended, which not only lost a considerable number but checked the supply and disturbed the market.

It may seem incredible that this is the case, but such is the fact, as may be seen by reference to Lord Wantage's Committee. (Report of Sir A. Haliburton, paras. 16 and 45.)

Such a system might suit well enough the times of Charles I, when the standing army was a menace to the nation; but does it not seem a little out of date now? From some of the causes I have named, the number of recruits required this year may be comparatively small and the recruiting may at the same time be fairly brisk, and the supply plentiful. Next year perhaps we know by actuarial forecast that the demand will be much larger, owing to circumstances affecting the enlistment of seven years back. And next year the supply may be bad. Harvests may be good, the labour market flourishing, wages high, and few recruits coming forward. Would it not be better to enlist more men than we actually require in order to provide for the larger demand we know is coming next year, when the supply may be, and probably will be, smaller? Certainly it would, but Parliament forbids it, and in face of the establishment rigidly fixed, and which must at no time be exceeded, we cannot help ourselves; recruits must be turned away, enlistment checked, and the supply cut off. This is fatal to an army dependent for its very existence on voluntary enlistment.

If we might even strike the average for the year, and exceed at one time the authorized number in view of being below it at another, things would not be so bad; but this we may not do.

We may be, indeed we must be, at certain times below the establishment; we must never be above it; and thus every year we show a certain number as "wanting to complete."

So certain is this, that the financial authorities at the War Office do not estimate for the full numbers, as may be seen in answers to to Questions 14,197, 14,198, by Mr. Knox, the Accountant-General, when examined before Lord Wantage's Committee. The commencement of the trooping season sees most of our units at home up to their full strength; but once the drafts for India have gone out, and the invalids and time-expired men from abroad have come home and been discharged, we are necessarily much below strength in our home army. This is stated by Major-General Roche, late Inspector-General of Recruiting, in his evidence before Lord Wantage's Committee (Questions 468, *et seq.*).

He recommends that we should be allowed to temporarily exceed the numbers laid down by Parliament, provided the average for the year is not exceeded.

I would go further than that, and recommend either that a certain discretion be left in the hands of the War Department to exceed the average if necessary; or, if that is not advisable, then the numbers should be fixed, not for one year, but for a period of several years, in advance. My reason for this recommendation is as follows:—

General Roche's proposal would solve the difficulty as regards

numbers; it would not solve it as regards *age*, and that, as I have shown, is our real difficulty for our foreign garrisons. It is useless our having our full complement of men if a very considerable proportion cannot go abroad; and we are therefore obliged to look, not one year ahead, but two or three years ahead.

Suppose the actuaries tell us that two years hence, say in 1894-95, we shall require an unusually large draft for India and the colonies, exceeding the normal draft by some 2,000 men. We should have the power to at once set to work enlisting some 2,000 more men than we ordinarily require; or rather, we should enlist the number that it is calculated will produce 2,000 men, *all over twenty years of age*, some two years hence.

We should, in fact, take steps to meet the demand, not only as regards *quantity* but as regards *quality*.

I am unable to say to what extent this system of looking ahead is carried now by our military authorities in fixing the numbers Parliament is asked to authorize; but, if done at all, it is not carried to a sufficient extent.¹

I can indeed see no reason why the army should not in this respect be treated in the same way as the greater part of the foreign armies are treated, or, indeed, our own navy. Germany, for instance, does not fix her peace strength every year and every year at a different figure. She fixes it for a period of years, and thus ensures a certain continuity, and at the same time imparts to her system an elasticity ours lacks.

Yet Germany maintains her army by obligatory service; we maintain ours on the much more precarious system of voluntary service.

If such a measure is wise for Germany how much more wise would it appear to be for us.

The shipbuilding programme for the navy is now based on this principle, and is extended over a period of years. Why? Because a ship is not built in a day. And in the same way an efficient and *effective* soldier is not produced in a day. Now that the age on enlistment of the greater number of our soldiers is between eighteen and nineteen, it takes something under two years to make most of them *effective*, that is to say, fit for universal service at home and abroad. The navy, therefore, has been placed in this matter beyond the reach of party politics, or the chances of fluctuating public opinion. It is, to a great extent, independent of that annual and perpetual Parliamentary control which might have been necessary 250 years ago, but which is now not only unnecessary but mischievous and cumbersome.

Is it too much to ask that the military service, which in some ways is more difficult of organization, be placed on the same reasonable footing in this respect, and freed from the rigid and old-fashioned bands with which its organization is now encircled?

If the two measures I have recommended for the solution of the draft difficulty are not adopted, there still remains the alternative of raising fresh regiments and adding them to the home army.

¹ Colonel Goldsmid states in his evidence before Lord Wantage's Committee that this is not done; but I understand that it is now done to some extent.

It would take eleven additional battalions to bring the home establishment of the infantry of the line up to the foreign one; but it should not require this large addition to relieve us of our present difficulty. Five extra battalions would probably suffice.

But I much prefer the adoption of the other two methods; and certainly the means of recruiting, not for our present requirements, but for those of two years hence, should be granted.

And the actuarial calculations which would be necessary should be made for each battalion, not for the Indian and colonial garrison as a whole; for, although I have for convenience sake spoken of the home army and the foreign army, it must be remembered that the battalion is the unit, and the supply is made by one battalion to another, and not from the army at home as a whole to the army abroad.

As regards the strength of battalions abroad. Every battalion should have one strength, and thus all would be interchangeable. Now a battalion is ordered, say, from Gibraltar to Hong Kong, and its establishment alters; again, from Hong Kong to India, and again its establishment alters.¹ These moves cannot always be foreseen—certainly not some two or three years beforehand—and thus provision cannot be made for the increased drafts suddenly required. This prevents an accurate forecast as to the amount of men an individual battalion will require a year or two hence, and it is a fault of system which, moreover, is quite valueless and unnecessary. This is alluded to in the evidence given before Lord Wantage's Committee.

The difficulty of finding adequate drafts for India and the colonies being once overcome the system now maintained would, with certain minor alterations, be found to meet the requirements of the Empire.

These minor improvements I will now consider as briefly as possible.

In the first place as regards recruiting, the conditions of which should be made more regular and less fluctuating.

Our plan hitherto has been to continually change the physical standards according to the number of recruits we require. When the supply diminishes or the demand increases we lower the standards. When the demand grows smaller or the supply larger we raise the standards.

The physical standards thus become a sort of escape pipe, and we open or close it at will.

This seems unwise and unpractical, for two reasons.

A soldier of, say, 5 ft. 4 in. is either fit for the ranks, or he is not. If he is fit at one time, so he is at another.

If he is not fit we should not accept him, but take other means to get sufficient recruits.

If he is fit, why should we reject him at one time and accept him at another?

There should be a minimum standard below which we should not go.

¹ The establishments laid down in Army Orders for July, 1892, to some extent rectify this; but there are still certain colonies, containing six battalions in all, which have a different establishment from other colonies and from India.

Fix it once for all, with such difference for the different branches of the Service as may be considered right, and do not depart from it.

Increase or reduce the number of men enlisted by any other means, but do not vary the physical standards, thus admitting at one time a man we should reject at another, and *vice versâ*.

Not only is the physique of the army thus made to fluctuate, but an element of uncertainty is imparted to the market, and the supply unsettled. Again, as to the disregard of age in its relation to the physical standards. A young man of 18 and a full-grown man of 25 have now the same standards applied to them, in spite of the fact that the difference in age should account for at least 2 in. difference in growth.

A man of 25 years of age who is 5 ft. 4 in. high is a worse stamp than a youth of 18 years of age and the same height. Yet both would now be admitted, and very possibly the preference given to the man of 25, because he is older. The correlation of the physical standards is insisted upon as important by all the best authorities, but the relation of physique to age does not seem to be sufficiently considered.

It would be difficult to carry it out completely, but it might be done to a certain extent. For instance, all men below 20 might have one standard and all men above 20 another.

No doubt something has been done in this direction already, and medical officers are guided in their inspection by more rational rules and scales than was formerly the case; but much might still be done.

And the inspecting officers themselves might be subject to a central supervision which would ensure the same class of recruits being taken throughout the country, and greater uniformity of rejection or acceptance. This might be ensured by an inspector, who should travel from one recruiting station to another, to supervise the inspecting officers.

There is probably more care taken in the selection of recruits for our army than in any other. The Inspector-General of Recruiting, in his Report for 1888, after noting this, says: "In other armies the main care of the inspecting officer is exercised lest any recruit who might render service should be too easily rejected. In the British army every officer who successively inspects a recruit endeavours to find some point with which he can find fault."

The rejections are now greater than they used to be. The number rejected very rarely reached 400 per 1,000 before 1879, and for the years 1874 to 1878 did not exceed 300 per 1,000.

In 1879 the standards became, very properly, a medical matter, where previously they had been in the hands of military non-medical officers. The result was an increase in the rate of rejections, which jumped to 407 per 1,000 in 1880 and has only once since been below 396 per 1,000. Deputy-Surgeon Don, in his already quoted lecture in 1889, gave the average rejections for 1877, 1878, 1879, at St. George's Barracks, London, as 28·97, and for the next three years as 46·87. The rejections for want of chest girth greatly exceed those for want of height and weight, and this seems to show that the chest standard is not in accord with the other two. This should be rectified.

The question of nationality is one of some importance, but has hitherto been little considered.

The result of some 53,000 observations shows that the average height and weight of full-grown males varies according to their nationality. The following table gives the averages deduced from those observations :—

Nationality.	Height in inches.	Weight in lbs.
Scotch	68·61	165·3
Irish	67·90	154·1
English	67·36	165·0
Welsh	66·66	158·3
Average....	67·66	158·2

It therefore becomes of some importance to enlist in proportion to the distribution of the population. Now this distribution has undergone a considerable change in the last twenty years. The proportions per 1,000 of the population in Scotland, Ireland, and England and Wales in 1871 and 1891 were :—

Year.	English.	Scotch.	Irish.
1871 '.....	721	106	171
1891	768	106	124

Now the proportion per 1,000 of the recruits enlisting in 1871 and in 1889 and 1890 (the last years for which the figures are available) is as follows :—

Year.	English.	Scotch.	Irish.	Elsewhere.
1871	790·9	82·4	119·7	7·0
1889	784·0	88·0	113·0	15·0
1890	774·0	83·0	126·0	17·0

The proportions per 1,000 of the army in general at two different dates may now be given.

Year.	English.	Scotch.	Irish.	Elsewhere.
1st Jan., 1873.....	674	85	237	4
1st Jan., 1892.....	769	83	135	16

It will be observed that the numbers of recruits entering the Service and of men actually serving are in no case up to the proportion of the population as regards the Scotch, the largest race; and, it may also be added, the percentage of rejections in Ireland, which in 1871 was heaviest, in 1889 and in 1890 was lightest.

It looks as if we might with advantage enlist more Scotchmen, and be rather more stringent in our examinations of Irishmen. The foregoing figures are taken from the Census Returns, the Army Medical Reports, the Army Annual Returns for the various years, and from Sir William Aitken's "The Growth of the Recruit."

Once the recruits are passed into the service, I should be inclined to make a distinction between those over 20 and those under that age.

The 20th year is generally looked upon as the first one of manhood. It is the one in which most foreign nations accept their soldiers, and, as they employ compulsory service, they can fix the age of admission when they please. Moreover, until he is 20 the soldier is not properly effective, for he is only available for one-half of our army. If all men under 20 were enlisted, as I suggest, for a period that will insure them seven years in the ranks after 20, they might with advantage be placed in another category until they attain that age, and be classed as "young soldiers." While still "young soldiers" they should have rather shorter hours and rather less work; they might be exempt from certain duties and not be made to perform long marches in marching order.

Their gymnastic training should be proceeded with, but care should be taken that it is not overdone; in a word, allowance should be made for their youth, and for the fact that they are not full grown. This is attempted now, but cannot be properly carried out because the years they spend in the ranks under 20 must be taken out of their seven years of service, and thus the army above 20 is very much diminished. And advantage should be taken of this period of comparative rest and exemption from really hard physical labour to complete their education in other ways. Opportunity should be taken to teach each man a trade, or to encourage him to improve himself at any trade he may already possess. He would then, on leaving the service, be not without some means of earning a livelihood. I am aware that this is said to be only possible in theory but cannot be carried out practically, but I think this is only because we now take a recruit of 18, almost from the very first, for all kinds of work, and thus leave him, especially in his first year or two, scarcely any leisure off parade or away from barrack duties. I think much might be done in the way of educating men to certain trades. It requires care and organization no doubt, but these it should receive. It is not enough, having enlisted a man, to pitchfork him, as it were, into military life, and then, when his service is over, to pitchfork him out again. That may do in a conscription army where men are recruited by main force; it will not do for a voluntary army, as we are gradually beginning to understand.

And this suggests the question of employment in civil life. This, in my opinion, is one of the most important matters in connection with a voluntary army. It has lately attracted much attention, and employment is now found for men in the Post Office, in other of the great State departments, with the leading railway companies, and in other quarters.

The initiative is due to private enterprise; and, of course, much must depend in a case of this sort on the public spirit of the nation.

It is not by any means a mere sentimental question, that of finding a means of subsistence for deserving old soldiers; it is something more. It touches the general public very nearly in two ways. If some means of employment are not found for our comparatively young soldiers on leaving the service, recruits will be scarce; and the scarcer recruits, the more has to be paid for them. It might come to

paying the great price of conscription. Again, a steady man who has learnt discipline and obedience in a good school, who has perhaps learnt a trade, who can read and write, is sober and respectable, and has in his pocket a certain sum, is surely better than his brother who has not been through the ranks. The employer of labour thus not only does a patriotic thing when he takes a Reserve man or an old soldier into his employ, but he benefits himself directly and indirectly.

I do not think this question of employment has hitherto been properly appreciated either by the military authorities or by the public.

When a man in old days entered the service for something like 21 years or more (that is, provided he re-engaged), he was discharged at the age of 40 or upwards with a pension.

He thus found the army a profession for life, and it gave him from the age of, say, 20 upwards, a means of livelihood. This is not so now. A man enlisting at 18 or 19 for seven years with the colours receives, it is true, a lump sum at the end of that time, and draws Reserve pay of 6*d.* a day for five years more. But at 30 he is generally once more without any support from the State. The contrast, then, between his position at 30 and that of the long-service soldier at 40 is very great. On the Continent it is not necessary to consider this, because a man is taken for the army whether he likes it or not, his inclinations are not consulted, and if rather more men are wanted in any one year, they are taken—there is an end of it. But we, who must rely solely and entirely on the attractions of the service to obtain any men at all, cannot afford to disregard the popularity or non-popularity of the army. We must ever be on the look-out to increase its popularity, and to add to its attractions. The necessity of finding employment for men on leaving the ranks is, therefore, imposed on us by two considerations—that of expediency and that of duty.

I have long thought that many of the permanent duties of our camps and barracks might be performed by Reserve men. Such duties as those of orderlies, police, caretakers of canteens, recreation rooms and grounds, &c., might, with advantage, be handed over to such men. Commanding officers would then have the men in the ranks much more at their disposal than now, and the Reserve men would also profit.

Should a "national emergency" arise, most of these posts would of necessity disappear; for the camps and barracks would be emptied, and the army in the field would have no need for half the employed men required in peace. The Reserve men thus employed in peace would, therefore, be at liberty to rejoin the ranks.

The value of the Reserve from a military point of view is not unfrequently called in question, and it is sometimes asserted that, owing to the want of training of the men composing it, it would be of little value in war. I cannot subscribe to this. It must be remembered that the greater part of these men have spent 7 years in the ranks, at a time of life when one does not generally forget what one learns. Moreover, they have none of them been more than 5 years away from the ranks, and the mean absence is $2\frac{1}{2}$ years only. This compares well with foreign armies, whose men only receive 3 years' training

in the ranks, at the outside, and remain in the various classes of the Reserve for a great many years. It is true they, or some of them, receive a short periodical training from time to time, but I doubt very much if a German or French soldier, say, of 30 years of age, if called upon to rejoin the ranks from the Reserve, finds less to learn than our Reservist of the same age.

But in any case a week's drill will probably make him as good as ever. And such a man, however much he may have forgotten, is certainly a better bargain than a raw recruit of 18 years of age or less, of inferior physique, for whom we have paid, perhaps, 25 guineas bounty and levy money, and who is but a civilian and requires months of training before he is fit for the ranks of the active army. Yet such was the man we formerly received, as I have shown; and such the alternative system to the present one.

But if we could ensure the Reserve men a certain training, even once in three years, it would, no doubt, be a good thing. That such is impossible I do not believe, seeing the ease with which we have lately called up men to become acquainted with the new rifle, and the manner in which the Militia come up for their training.

If a periodical training is adopted, it should be fixed for a certain time of year, and that time should not be departed from.

If the supplementary reserve I have recommended were adopted, I should make it a rule that every man agreeing to continue to serve in it should go through a short training before so continuing.

Another question is that of territorialization. Among the many reforms introduced in the last twenty years, this might be made one of the most important. The necessity in a voluntary army of connecting it by as many and as close ties as possible with the nation is too obvious to need insisting upon.

It was, therefore, a wise and politic step in itself, by which it was sought to identify each infantry regiment with a certain county or territorial area. Unfortunately the system cannot be rigorously carried out, because it is impracticable to distribute our comparatively small forces equally throughout the United Kingdom, and the territorial tie cannot be made complete or universal. But where it does exist, it is of great importance, and that it is increasing rapidly is shown by the increased number of men now serving in the territorial regiment who were born in the regimental district.

On January 1, 1883, there were thus serving 24,247 men, while on January 1, 1892, this number had risen to 53,480. (Report of Inspector-General of Recruiting for 1891.)

The close association between the Militia and the Regular army is another important matter, as it confers advantages upon both. The number of recruits furnished to the army by the Militia increases almost regularly every year. In 1891 it amounted to 13,542. It must, of course, be remembered that these men are merely transferred from one pocket to another, as it were. If they are gained to the Regulars they are lost to the Militia.

It is of the greatest importance that the army shall be well known in, and closely connected with, the country, and as regards this point

there is at present a tendency to concentrate our troops at a few large garrisons, which I am afraid may prevent this familiarity of the country with its army.

The idea is that by collecting a large number of troops in one camp or garrison they obtain an opportunity of manœuvring in large bodies, which is alike good for the troops and for the commanders. This, no doubt, is a laudable object, but it may be carried too far. The combined operations or drills rarely last more than a few weeks in summer or autumn, and during the rest of the year the troops go through their ordinary drills just as they do in smaller garrisons. Would it not be better to scatter our troops as much as possible (having, of course, regard to other circumstances) throughout the country in small garrisons, marching them in the summer from these garrisons to the nearest large camp, at which for a few weeks they would go through their combined operations? This would give each corps some needed exercise in marching, would bring them into camp in good condition, and would accustom the country districts to the sight of soldiers—thereby stimulating recruiting—while the troops throughout the greater part of the year would not be concentrated in a camp or large garrison town but, distributed throughout the country, would familiarize it with military life, and if quartered in their own counties, might strengthen greatly the territorial tie.

Such a plan would seem to be in accord with the tendency of the age, which is to draw closer the ties that bind the army to the country. (See Report of Recruiting Commission, 1867, p. 15.)

As regards re-engagement, or rather extension of service beyond the first period engaged for, I hold a strong opinion that, save in the case of non-commissioned officers, it is very unwise. The system introduced some twenty-one years back was one of a limited period of service in the ranks, to be followed by another period in the Reserve. Let us have the courage of our opinions with regard to this system; let us give it a fair chance; above all, do not let us fall between two stools, and encourage men to prolong their service in the ranks in place of going into Reserve, for by doing so we adhere neither to the old long-service system nor to the new short-service one. We establish, in fact, a compromise, and, like most compromises, it is a bad one. Every man who extends his service is a loss to the fighting strength of the army, for that strength would be composed of the men in the ranks *plus* the men in the Reserve. A man who remains in the ranks at the expiration of his first period of service is lost to the Reserve, while he is not gained to the active army, since did he go to the Reserve, his place in the ranks would be taken by another man.

There are many officers in the service who are quite naturally only too anxious to retain men when their seven years in the ranks have expired. They are anxious to keep them, as a rule, for the credit of their battalion, battery, or regiment, because they think, and very justly, that a trained man of seven years' service, and perhaps 26 years of age, does them more credit than the recruit who will fill his place and who knows nothing. But by thus acting they

destroy the system, which is not constructed with the object of giving them a perfect battalion in peace, but a perfect battalion in war, which is much more important. When war comes, their trained soldier rejoins them, and, in addition, they have the young soldier who took his place, and who, if not yet fully trained, will very soon be so. In the year 1891, 3,802 men who originally enlisted for short service extended their engagement to complete a period of 12 years. These 3,802 men do not add to the strength of the army with the colours, since their places would be taken by recruits did they all go to Reserve on completion of their original period of engagement, but they do subtract from the strength of the Reserve, which, supposing they all survive to complete their term of service, loses 3,802 men in one year or, rather, fails to increase its strength by that number. (Army Annual Return, 1891.)

On the 1st of January, 1892, out of 175,143 non-commissioned officers and men who had enlisted for short service, 17,381 had extended their service to a longer period in the ranks. Of 26,925 others who had originally enlisted for long service, no less than 12,533 had re-engaged for a still longer period. Thus 29,914 men were then serving who had been permitted to prolong their original term of service, and of these 14,991 were privates.

Most of these men cause a corresponding diminution in the Reserve, without increasing the army with the colours by one man; and every man lost to the Reserve is a loss to the fighting strength of the nation.

As regards the length of service in the various branches of the army, it would seem advisable to adopt one universal term, except for those troops which, like the Guards, do not take their turn of foreign service. There seems to be but little object to be gained in varying the length of service according to the branch, and doing so destroys the regular, settled, and universal conditions of service which I consider most necessary for a voluntary army dependent on the inclination of the individual. A perfect knowledge of the varying conditions is scarcely to be expected of the ordinary recruit, who may find himself mistaken in them when he desires to enter a particular branch.

All branches serving abroad should be recruited alike in this particular, since the foreign service is the governing factor in the question, and is the condition which decides the length of service. Certain distinguished authorities giving evidence before Lord Wantage's Committee desired to make the garrison artillery, for instance, a long-service corps, since they hold it requires no Reserve. It certainly would seem that a Reserve is as much wanted for this corps as for any other, but even if it were not, why return to long service with all its evils? As to the time a garrison artilleryman takes to learn his duties, it should certainly not be longer than that taken by his comrade in the mounted branches. Moreover, long service is unpopular, and the recruits for the garrison artillery are not too numerous as it is.

The question of pay and the closely associated matters of food, clothing, &c., is a very large and vital one in an army recruited as

ours is. It must affect, to a certain extent, any considerations of organization, but I cannot here attempt to lay down more than a few points in connection with it.

Table L, which I have been at some pains to compile from various sources, gives rates of military pay and of civilian wages in certain trades for a very considerable period. It can only have, however, an academic value, since no real comparison (as stated in Lord Wantage's Report) can be properly made between civilian and military wages. But I think the general principle to be observed in the pay of a voluntarily recruited army is this. The sum found necessary to induce sufficient men of a certain quality to enlist having once been fixed, care should be taken, first, that the individual recruit is made well aware of what that sum is; second, that it suffers no diminution, such as occurs through what are known as stoppages, unless such diminution is a result of the man's own misconduct or breach of contract. The same law applies to food, clothing, barracks, medical attendance, &c., in fact, to all his emoluments of whatever nature. If the man understands that he is to get a complete free ration daily, a complete free outfit maintained at public expense, he must get it, or his mind, and the mind of the general public, must be disabused of the idea before the contract between the man on the one hand and the Crown on the other is sealed.

We must remember that our army is a non-conscription army, and we must approach all our relations with our would-be soldiers (and, indeed, with our soldiers after enlistment) with that fact firmly established in our minds. Any forgetfulness of it leads us astray, and whatever foolish notions the individual may get into his head, we must be careful to disabuse him of them if we are unable to accede to them. Economy on a large or small scale in these matters may prove a very false economy in the end.

The question of deferred pay has been much debated. Its object is twofold. It provides a man, on leaving the service, with a lump sum on which he can subsist while he looks round for employment in civil life, and it serves as an inducement to him to leave the ranks at the expiration of his first period of service and thus carry out the principle of short service.

If two of the measures I recommend were adopted, namely, a perfect system of finding employment for men quitting the ranks, and a strict adherence to the short-service system, by not allowing any private soldier to extend his service, deferred pay might be abolished. Certainly the amount now given, 3*l.* a year for every year of service, might be reduced, say, to a sum of 10*l.* for a 7 years' term. But as long as men are allowed the option of extending their service, and thus defeating the system, deferred pay is necessary to induce them to leave.

With regard to those native and local forces which form the permanent, and in certain cases the only garrisons of our foreign possessions, this would not appear to be the place to enter into a detailed consideration of their internal organization.

Such organization is but little affected in its details by our

Imperial needs, but rather by the distinct local circumstances of each individual case.

Any detailed consideration of these circumstances could only be attempted after careful investigation and prolonged study on the spot, which alone would enable one to acquire the requisite knowledge. And such consideration would very largely exceed the limits of a single essay. It does not seem, moreover, that—even if possible—it could come within the scope of the present discussion, outside the limits of which it must surely lie.

It must not be forgotten that these local colonial forces are rather the small permanent nuclei we must maintain to keep order, and to meet any sudden insult or daring raid, than a sufficient force with which to withstand a serious attack by a great Power.

In the latter event these colonial forces would require assistance first from the British navy, second from the British army, and one of our requirements is, as I have said, a force to despatch to their assistance if necessary. I give in Table K a statement of the numbers of these local forces in round numbers, and I do not propose in this essay to discuss their various organizations. They are, as will be seen, of no great strength with, of course, the exception of the Indian forces, not included in this table; and they must be looked upon as available only for coast defence, or for the garrisons of our coaling stations and most important ports, of course in conjunction with such British troops as are already on the spot, or as would be despatched from England.

India is in a somewhat different position as regards her native forces, but even here the British troops both in peace and in war form the more important part of the organization, to which the native forces must, in a measure, conform. The organization for war of the Indian native forces would follow much the same lines as that of any other force in the field; and most authorities—some of whom I have quoted—regard their numbers as ample, and their general organization as adequate. Certain broad rules may, however, be laid down for all these minor organizations. They should, in the first place, be raised, maintained, and organized with a due regard to their differences of race, religion, habits, and language. The main principle should be followed, in an extended Empire like India, of mixing races together for tactical purposes, but of separating them for administrative purposes. In the same way, a nucleus of British troops should, both in peace and in war, especially the latter, be associated with each unit higher than the administrative unit.

Troops employed for coast or harbour defence, or in selected positions or fortresses, should, as far as possible, be exercised and trained in those parts of the defences they would be called upon to occupy in war; and they should be assigned to those defences with a careful regard for local considerations.

With the exception of the Indian army—which alone might be called upon to act as a field force—reserves are but little required for these local troops (in the sense in which we now understand reserves, as opposed to the first line or active army)—and the con-

stitution of these forces should, as a rule, be that of Militia or Volunteers. And the chief commands, certainly the duties of inspection, should be held by officers of the British army temporarily lent to the colonies for this purpose.

The composition of these forces would of course vary with the duties they are called on to perform. For the defence of a coast or a harbour, cavalry would be of little use, and artillery should predominate; but a force that may have to take the field must, of course, possess a proportion of all arms.

And the object for which these forces exist must ever be kept clearly in view, nor must the fact be lost sight of that they do not constitute a separate military force organized for considerable operations and to be employed on such operations by themselves, but that should any serious danger threaten the colony for whose protection they exist they will receive the co-operation and assistance of the mother country.

With regard to the despatch of troops from the United Kingdom to take part in any of the operations I have enumerated in Part II, certain general rules should also be our guide. We may, as I have said, require to participate in a European War, to despatch a force for some minor campaign, or to strengthen and defend a colony.

I have discussed the numbers required in these cases, and I have considered their general organization. But there is another question to be taken into account—that of time. Time may be a most important part of the question, and the arrangements for the despatch of a force should be made with a view to the saving of time. This does not seem to have been sufficiently considered. The stores, ammunition, and equipment of our home army are now being concentrated at various central places inland, with a view, I presume, to the concentration at those places, or in their neighbourhood, of the home army, for home defence. These arrangements are, in fact, made to enable that army to resist invasion.

This is all very well, but resistance to invasion, although of the greatest importance, is not necessarily of the greatest urgency, as Lord Roberts well says in his letter to Sir Charles Dilke ("Morning Post," July 25, 1892).

For one serious threat of invasion we have at least a hundred occasions on which we are obliged to despatch troops from these shores.

Now the rapid despatch of these troops depends to a very great extent upon the maintenance at the ports of embarkation of the equipment, stores, &c., they require to take with them.

It would, therefore, seem a serious error to lock up in the interior of the country the equipment that will be required, if not to-day, then to-morrow in order to despatch to the seat of war—whether it be in Europe, in India, in Egypt, in a foreign country, or in a distant colony—a force, large or small, on the rapid despatch of which our interests may very greatly depend.

If the various alterations I have recommended in our present system were carried out, the organization thereby produced should, in

my opinion, provide us with a force of rather more than 100,000 men at home, an equal force abroad, and a reserve approaching the same number.

Besides these we should have some 250,000 to 300,000 Militia and Volunteers; a native army in India of 150,000 men, with reserves in the shape of Volunteers and the contingents of the native princes—amounting in all to perhaps some 50,000 more; and colonial local troops sufficient to hold their respective colonies against any sudden minor attack.

As regards quality, the British army at home and abroad would be slightly older, and, therefore, more effective and efficient, than now; the home army in particular would not be so largely composed of quite young men, and the army would be maintained at its full strength with men of sufficient age without having recourse to some of the expedients of late years.

The auxiliary forces, being rather diminished in numbers, should thus gain in efficiency, without any greater expense.

In case of threatened invasion we should call out the army Reserve, 75,000 of whom would form one-half of the regular home army. The other half would be composed of 75,000 men out of the 100,000 with the colours, the remaining 25,000 of whom would be recruits, available as a reserve should the situation continue.

The 25,000 men of the Reserve not accounted for would go to help the colonial garrisons and coaling stations, and to bring up our forces abroad to war strength.

No Power would seriously threaten the invasion of England and invasion of India at one and the same time. Should invasion not be threatened, but should war with an European Power involve us, we could spare 25,000 men from our home garrison, supplying their place with Militia. To these we should add the 100,000 of the reserve, and thus we should be able not only to strengthen India and the colonies, if necessary, each with 25,000 men, but we should have 75,000 to take the field in Europe.

Turning to need No. 4, the despatch of a small force for a minor campaign, we should, in most cases, be able to supply that, as we have hitherto done, from certain of our foreign garrisons with the addition possibly of a brigade of Guards, and by also despatching a few thousand men from home.

But if a larger expedition were necessary, part of the Reserve should be called out.

The above are our requirements for war, and the numbers given in each case are really beyond what we should probably require to place in the field. In that case we should not require the whole of the reserve of 100,000 men, and the portion not called out in the first instance would act, with the recruits of the home army as they became efficient, as reserves and reinforcements for the army in the field.

Passing to requirement No. 3—the maintenance of our foreign garrisons in peace—the measures I have recommended should enable us to meet it fully. They would, moreover, ensure the necessary

reserve to enable us to meet our war requirements as already enumerated, and thus the preparatory processes of peace should provide the finished material we should hold in reserve for war.

The following is a brief summary of the alterations suggested in the existing system :—

1. Greater elasticity as regards the establishment.
Establishment to be fixed by Parliament for a term of years.
Power granted to enlist above the establishment, provided the general average of the fixed period were not exceeded.
Greater prevision as to recruits enlisted. Enlist *now* to meet wants of *two years hence*.
2. Conditions of service altered so as to ensure a service of seven years after twenty years of age to every man who is liable for service abroad in peace. Foreign establishments equalized.
3. Establish a fixed minimum physical standard for each branch, and vary the standards according to age.
4. Enlist recruits in proportion to the distribution of the population.
5. Classify soldiers as below twenty and over twenty, and give them duties accordingly.
6. Improve the organization for finding employment for soldiers of good character in civil life.
7. Retain men in Reserve up to the age of forty, passing them into various sections.
8. Establish a periodical training for men in Reserve.
9. Increase the existing territorial ties.
10. Forbid extension of service or re-engagement except for non-commissioned officers.
11. Establish a uniform length of service for all branches proceeding on foreign service.
12. Make certain improvements in the pay, clothing, food, &c., which will reduce stoppages to a minimum.
13. Place rapidity of mobilization and despatch of foreign expeditions before that of mobilization for home defence.

Conclusion.

I commenced this essay by pointing out the two main conditions in which our circumstances differ from those of other nations.

I shall have written in vain if I have not made it apparent that in my opinion these two conditions must be ever present in our minds when constructing a military organization, and must indeed form the main thread round which that organization is woven. The fortunate fact of our insular position allows us to indulge in an army in which service is voluntary, but that very indulgence imposes upon us the duty of making that army a popular institution, part and parcel of the national life. This necessity is absent from the existence of other armies, and when any of our powerful neighbours want more men and more recruits they need not rely on patriotic spirit, on popular sentiment, or on the attractions of the service.

Compulsory service gives them the means of obtaining their men by *force majeure*.

Not so with us. In a country where living is dear, wages are high, and everything connected with life is in proportion, we depend for the maintenance of our army upon the attractions it offers.

We must, then, suit them to the condition of the country, keeping our finger always on its pulse, never content to rest on our oars, always aiming at something better, never knowing finality. Progress in these matters is possible in every army, much more possible, much more necessary, with ours than with any other.

We must strive, then, in every way to link the army with the country, to make it fill a place in the life of the nation, to let its efficiency go hand in hand with the national prosperity, and to impress upon all, not only that the army is essential to their well-being, but that their co-operation is necessary to its success.

And the second condition, which complicates so greatly the problem placed before us—the vast interests lying far beyond our home shores, which our army recruited from within those shores is required to defend and extend—it also imposes on us a duty, the duty of making our system as elastic as possible, not a rigid bar of iron placed across our gates, but a plastic mass, ready to accommodate itself to all the varied and varying circumstances of its employment. The hard and fast rules adopted by nations having nothing but their home territories to defend—by which they take a certain number of men on a certain date, place them within the military machine, turn the handle for a given time, and produce them as the finished article to make way for other raw material to be ground into shape in the same remorseless way and in the shortest possible time—will not do for us.

The principle, indeed, we may adopt, but its details will not suit our conditions. They must be suited to all the circumstances of our case, must accommodate themselves to all the necessities of a very extended Empire, maintained under very varying conditions all over the world; they must be elastic, adaptable, pliant.

Too much rigidity seems to have crept into them, too much adherence to principles suited perhaps to a former state, too little appreciation of changed and changing circumstances.

Parliamentary control, admirable as it is in theory and in principle, may be carried too far in practice and in detail, and a care that was justly exercised in days when the nation was rightly jealous of its freedom seems now unnecessary, and is undoubtedly mischievous.

We must move with the times in the organization of our army, unless we wish it to be a mere antiquated machine, animated no doubt with the old spirit, but tied and bound with the red tape of bygone regulations.

And above all things it must be remembered that the army exists for war and not for peace, and that the war army will be formed of the peace army *minus* its latest recruits and *plus* the Reserve; that is, from the peace army at home we shall eliminate some 25,000 young men who are not full grown and who have but a few months' training, and to it we shall add some 75,000 men under the present system—some 100,000, as I think might be done did we take measures to increase our Reserve—which men will be in the prime of life (chiefly

between twenty-five and thirty-five years of age), and will have had a careful training of at least seven years in the ranks. Thus, on mobilization we shall lose our youngest, least trained men, and shall receive three or four times their number of older, fully trained soldiers, and should be able to have under arms some 275,000 regular soldiers second to none in the world.

It will be observed that in the foregoing Essay I have taken our existing organization as my text. I have done so because I am convinced that in its main principles not only is it the best adapted to the needs of the Empire, but that it is indeed the only one by which those needs can be adequately met. There are, doubtless, points of detail in which modification is necessary, and those modifications I have, with all deference, ventured to point out. Whether they are wise or foolish time and experience alone will determine, but, were they adopted, I believe that the present organization, as by them amended, would be found the best adapted to our Imperial needs.

LIST OF WORKS CONSULTED, AND REFERRED TO IN THIS ESSAY.

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TABLE A.—*Showing Area and Population of Mother Country and Colonies of British, German, and Russian Empires and French Republic.*

Country.	Mother country.		Colonies.	
	Area in square miles.	Population.	Area in square miles.	Population.
Great Britain ..	121,000	37,000,000 (1891)	8,000,000	240,000,000
France.....	204,000	38,000,000 (1886)	690,000	16,000,000
Germany.....	208,000	49,000,000 (1890)	—	—
Russia.....	8,450,000	108,000,000 (1885)	—	—

Note.—Round numbers only are given.

Germany's colonies are inappreciable. She has some Protectorates of a certain size.

English and French Protectorates omitted.

Area of the world is 52,425,000 square miles.

Population of the world is 1,438,650,000 about.

TABLE B.—*Showing*

Year.	U
	Area in square miles.
1871	121,000
1891	121,000

Note.—Round numbers only are given.
Native States
Troops in Egypt
The numbers
India not be
The average t
192,665. V

TABLE C.—*Showing the Average Strength of Non-Commissioned Officers and Men at Home and Abroad from 1871 to 1892, and the Percentage Abroad in each Year.*

Year.	At home.	Abroad.	Total strength.	Percentage abroad.
1871	100,877	82,594	183,471	45.0
1872	99,306	83,709	183,015	47.7
1873	95,768	83,919	179,687	46.6
1874	93,114	84,991	178,105	47.7
1875	92,802	83,785	176,587	47.4
1876	92,781	83,511	176,292	47.3
1877	97,610	84,832	182,442	46.4
1878	105,006	87,807	192,813	45.4
1879	84,380	99,068	183,448	54.0
1880	87,843	93,326	181,169	51.5
1881	87,992	93,194	181,186	51.4
1882	90,075	91,207	181,282	50.3
1883	85,960	88,207	174,167	50.6
1884	86,013	89,271	175,284	50.9
1885	87,927	102,391	190,318	53.7
1886	94,060	101,845	195,905	51.9
1887	102,560	99,061	201,621	49.1
1888	102,688	100,413	203,101	49.4
1889	101,498	100,486	201,984	49.7
1890	101,211	99,654	200,865	49.6
1891	100,417	100,836	201,253	50.1

Showing Area, Population, and British Garrison of the United Kingdom, India, and the Colonies in 1871 and 1891.

United Kingdom.			British India.			Colonies.		
Area in square miles.	Population in millions.	British troops.	Area in square miles.	Population in millions.	British troops.	Area in square miles.	Population in millions.	British troops.
00	31½	104,991	908,000	191	62,834	4,000,000	11½	23,590
00	37½	104,860	944,000	220	72,288	8,000,000	18½	32,551

Numbers only are given.

States of India are not included.

In Egypt are included under head of Colonies in 1891.

Numbers of troops for 1871 are those present on January 1, 1873, the average numbers for 1871 in the Colonies and not being separately obtainable. They amount to 191,415 in all.

Average troops at home in 1871 were 105,757, and abroad (India and Colonies mixed) 86,908; or a total number of 192,665. *Vide* Army Annual Returns, 1871, 1873, and 1891.

TABLE D.—Showing the numbers of Recruits finally joining in each Year from 1862 to 1892, and the numbers "Wanting to Complete" or "Supernumerary" at the end of each Year.

Year.	Recruits finally joining.	At end of year.	
		Wanting to complete.	Super-numerary.
1862	6,728	3,067	
1863	10,209	4,128	
1864	14,465	4,915	
1865	12,982	5,737	
1866	13,640	1,916	
1867	18,006	619	
1868	15,743	3,278	
1869	11,049	4,133	
1870	23,031	9,280	
1871	21,927	3,044	
1872	17,507	3,128	
1873	16,602	..	1,048
1874	20,312	..	1,219
1875	18,375	897	
1876	29,116	522	
1877	28,280	..	1,489
1878	28,109	..	1,949
1879	25,594	..	3,794
1880	25,535	..	397
1881	25,499	..	2,254
1882	23,555	..	971
1883	32,924	7,357	
1884	25,754	2,609	
1885	39,552	3,265	
1886	38,953	2,373	
1887	30,751	..	650
1888	24,726	626	
1889	29,117	3,994	
1890	30,918	4,602	
1891	36,003	4,949	

TABLE E.—Giving Statistics of Army Recruiting from 1800 to 1814,

Year.	Number of recruits raised.					Bounties offered.				
	From civil life.		By "Additional Force" Act.	From the Militia.	Total.	From civil life.			From the Militia.	
	Men.	Boys.				Men and lads.	Boys.		Men.	
							Under 16 years and 5' 2".	Under 16 years and under 5' 2".		
						£ s. d.	£ s. d.	£ s. d.	£ s. d.	
1800	17,829	..	..	..	17,829				
1801	17,413	..	..	..	17,413	3 3 0	..	..	..
1802	7,403	..	..	..	7,403	3 3 0	..	..	..
1803	11,253	..	..	..	11,253	{ 5 5 0 7 12' 6	{ 3 3 0 5 10 6	..	..
1804	9,430	..	1,658	..	11,088	{ 10 13 0 16 16 0 19 19 0	{ 8 8 0 8 8 0 10 15 0	2 12 6	..	
1805	10,180	1,497	8,288	13,580	33,545	16 16 0 ¹	8 8 0	..	10 10 0	
1806	10,337	1,538	5,834	2,968	20,677	11 11 0 ²	8 8 0 ²	2 12 6 ²	10 10 0	
1807	15,308	3,806	..	29,108	61,185	{ 11 11 0 18 5 6	{ 8 8 0 13 0 6	2 12 6 ²	{ 14 14 0 10 10 0	
1808	10,477	2,486	..			{ 16 16 0 ⁵ 11 11 0 ³	{ 12 1 6 8 8 0	4 13 6 3 12 6	{ 14 14 0 10 10 0	
1809	9,675	2,045	..			..	..	..	{ 14 14 0 10 10 0
1810	7,367	1,728	..	23,885	44,700	{ 16 16 0 ⁵ 11 11 0 ³	{ 12 1 6 8 8 0	4 13 6 3 12 6	{ 14 14 0 10 10 0	
1811	9,532	1,940	..			..	..	..	{ 14 14 0 10 10 0
1812	12,687	1,869	..			..	..	..	{ 14 14 0 10 10 0
1813	12,824	1,874	..	19,245	33,943	{ 16 16 0 11 11 0 ⁵	{ 12 1 6 8 8 0	5 5 0 3 13 6	{ 14 14 0 10 10 0	
1814	7,186	803	..	3,243	11,232	{ 5 0 0 3 14 6	..	..	..

¹ Levy money (in addition) £22 8s.² For limited service.³ Levy money (in addition)

Standards of age and height.						Establishment.	Effective.	Wanting to complete.
For infantry of the line.			For general service.					
Men.	Growing lads.	Boys.	Men.	Lads.	Boys.			
..	..	..	..	..	..	..	140,798	..
..	..	..	..	..	..	..	149,865	..
{ 25 years, 5' 7" and 5' 6"	17 to 19, 5' 5"	..	25 years, 5' 5"	18 years, 5' 4"	16 years, 5' 2"	..	157,995	..
{ 30 years, 5' 5"	17 to 19, 5' 4"	..	30 years, 5' 4"	18 years, 5' 3"	16 years, 5' 2"	..	95,375	..
{ 30 years, 5' 5"	17 to 19, 5' 4"	..	30 years, 5' 4"	18 years, 5' 3"	16 years, 5' 2"	..	136,480	..
{ 30 years, 5' 5"	17 to 19, 5' 4"	..	30 years, 5' 4"	18 years, 5' 3"	16 years, 5' 2"	..	144,847	..
{ 30 years, 5' 5"	17 to 19, 5' 4"	..	30 years, 5' 4"	18 years, 5' 3"	16 years, 5' 2"	..	165,573	..
{ 30 years, 5' 5"	17 to 19, 5' 4"	16 years, 5' 2"	35 years, 5' 4"	18 years, 5' 3"	16 years, 5' 2"	221,418	178,506	42,912
{ 30 years, 5' 5"	17 to 19, 5' 4"	16 years, 5' 2"	35 years, 5' 4"	18 years, 5' 3"	16 years, 5' 2"	226,836	204,177	22,658
{ 30 years, 5' 5"	17 to 19, 5' 4"	16 years, 5' 2"	35 years, 5' 4"	18 years, 5' 3"	16 years, 5' 2"	229,899	210,614	19,285
{ 30 years, 5' 5"	17 to 19, 5' 4"	16 years, 5' 2"	35 years, 5' 4"	18 years, 5' 3"	16 years, 5' 2"	231,583	213,214	18,369
..	..	..	..	..	..	233,853	210,926	22,927
{ 35 years, 5' 4"	18 years, 5' 3"	17, 5' 2" 16, 5' 0"	40 years, 5' 3"	18 years, 5' 2"	17 years, 5' 0"	245,851	220,061	25,790
{ 35 years, 5' 4"	18 years, 5' 3"	17, 5' 2" 16, 5' 0"	40 years, 5' 3"	18 years, 5' 2"	17 years, 5' 0"	255,428	230,469	24,959
{ 25 years, 5' 6"	18 years, 5' 5"	..	25 years, 5' 5"	18 years, 5' 4"	..	270,260	237,946	32,314

(addition) £23 17s. 6d.

⁴ Levy money (in addition) £23.

⁵ Unlimited service.

TABLE F.—Showing the Physical and Age Standards for Infantry of the Line since 1860

Date.	Minimum age in years.	Minimum height in feet and inches.	Minimum weight in lbs.	Minimum chest girth in inches.	Remarks.
1.2.68	17	{ 5' 6" 5' 5"	..	{ 33" 34" 35"	Men from 5' 6" to 5' 8" } "General " " 5' 8" to 5' 10" } to be un- " " 5' 10" and over } only for
20.10.68	"	5' 7"	..	..
29.1.69	"	5' 8"	..	..
20.5.69	"	5' 7"	..	..
31.5.69	"	5' 6"	..	..
15.1.70	"	5' 8"	..	..
4.6.70	"	5' 6"	..	..
3.8.70	"	5' 5½"	..	..	"Special" recruits, 5' 5".
15.11.70	"	5' 4½"	..	..	Men of 19 years and 33" to 34" chest o
16.5.71	20	5' 5"	..	..	For regiments in India only.
6.6.71	"	5' 5"	..	..
1.8.71	{ 18 19 20	" " "	.. .. ..	.. .. ..	Special recruits 17 to 18, at home only. Abroad only.
18.9.72	18½	"	..	..	Abroad only, where embarkation likely
9.10.72	18½	"	..	..	India only.
1.11.72	"	{ 5' 5" 5' 4½" to 5' 7"	.. .. ..	.. .. 34"	India only. Except rifle regiments.
14.11.73	"	5' 4½"	..	..	Rifle regiments only.
7.12.74	"	5' 5"	..	..	Not over 21 years of age.
1.6.76	18 to 30	5' 5"	..	..	Except rifle regiments.
24.10.76	"	5' 4½"	..	..	Short service recruits only.
1.3.77	18 to 25	"	..	..
1.10.77	"	5' 5"	..	{ 34" 35"	Under 5' 10".
21.11.78	"	5' 6"	..	..	5' 10" and over.
1.5.79	18 to 25	5' 5"	..	..	Except rifle regiments.
1.7.79	"	5' 5" to 5' 7"	..	..	Except rifle regiments.
1.10.79	"	5' 6"	..	..	Rifle regiments only.
11.5.80	"	5' 5"	..	..	Except rifle regiments.
1.7.81	19	5' 4"	..	..	Medical officer to be guided by a tab
5.9.82	"	5' 4"	..	33"	weight of youths of 19 and upwards.
4.4.83	18	5' 3"	..	33"	Men under 5' 10" only.
				33"	Special recruits.
1.2.84	"	5' 4"	{ 120 125 125 130 115	33" 33½" 34" 35" 32"	Men of from 5' 4" to 5' 5". " " 5' 5" to 5' 6". " " 5' 6" to 5' 8". " " 5' 8" and over.
7.2.84	"	5' 3"	..	..	Under 20 years only.
		{ 5' 4" " 115 " 115 5' 3" 115	115 115 115 115	33" 34" 35" 32"	Men under 20 years, of 33" chest and 1 Men under 5' 6". " from 5' 6" to 5' 10". " " 5' 10" and over.
1.9.84	"	5' 3"	..	..	Under 20 years only.
1.1.86	"	"	..	33"	" " " "
12.4.86	"	"	..	32"	Militia joining battalion only.
29.1.87	"	"	..	..	Suspended special enlistments under 1.
1.2.89	"	5' 4"	..	{ 33" 34" 35"	Men under 5' 6". " from 5' 6" to 5' 10". " of 5' 10" and over.

Note.—Maximum age always 25 years, except where noted. Standard unaltered since 1889, but recruits slightly enlisted by authority from Recruiting Department Headquarters when specially recommended as likely to develop into (Taken from Appendix 15 to evidence given before Lord Wantage's Committee.)

neral service" recruits not
be under 18 years. 5' 5"
ly for eligible recruits.

chest only.

only.

likely within 1 year.

TABLE G.—*Showing the Physical Standards in the French, German, and Russian Armies.*

Branch,	France.		Germany.		Russia.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
Infantry of the line....	—	5' 0'6'	—	5' 1'6"	5' 4'7" ¹	5' 1'2" ¹
Cavalry.....	5' 8'9" ²	5' 2'5" ³	5' 8'6" ²	5' 1'6" ⁴	5' 10" ⁵	5' 3'8" ⁵
Artillery.....	—	5' 2'9"	5' 8'6"	5' 3'5"	—	5' 4'7"
Engineers....	—	5' 5'3"	—	5' 3'5"	—	5' 1'2"

¹ Rifles.

² Cuirassiers.

³ Chasseurs.

⁴ Dragoons and hussars.

⁵ Cavalry of the line.

(From Appendix XVI, Report of Lord Wantage's Committee.)

a table showing average
wards.

and 120 lbs. weight only.

der 1.1.86 and 12.4.86.

ightly under it have been
op into efficient soldiers.

TABLE H.—Showing the Average and Mean Height, Weight, and Girth of Chest of the most favoured and least favoured Englishmen at various ages.

TABLE (1).—MOST FAVOURED, OR NON-LABOURING CLASSES.

		Years of Age.							
		17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	24 to 25.
Height in inches.....	{ Average	67.86	68.29	68.72	69.13	69.16	68.93	68.52	68.95
	{ Mean	68.00	68.50	68.75	69.00	69.00	69.00	69.00	69.00
Weight in lbs., including clothes, 7 to 10 lbs.	{ Average	141.03	146.00	148.20	152.07	152.30	154.78	151.70	149.20
	{ Mean	140.00	146.00	148.00	150.00	152.00			
Chest girth in inches.....	{ Average	33.98	34.44	34.77	35.25	35.42	35.30	36.10	35.96
	{ Mean	34.00	34.50	34.75	35.00	35.25	35.50	35.75	36.00

TABLE (2).—LEAST FAVOURED, OR LABOURING CLASSES.

		Years of Age.				
		17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.
Height in inches.....	{ Average	64.45	65.47	66.02	66.31	66.60
	{ Mean	64.50	65.50	66.00	66.25	66.50
Weight in lbs., including clothes, 7 to 10 lbs.	{ Average.....	116.40	123.30	128.40	130.60	135.40
	{ Mean.....	116.00	122.00	128.00	132.00	136.00
Chest girth in inches	{ Average	29.38	30.07	30.56	30.86	31.61
	{ Mean.....	29.50	30.00	30.50	31.00	31.50

TABLE J.—Showing the Percentage of Loss by Death and Invaliding to British Troops in I

Length of service.	1846 to 1857.			1885.			1886.			Di
	Died.	Invalided.	Total loss.	Died.	Invalided.	Total loss.	Died.	Invalided.	Total loss.	
Under 1 year.....	6.52	0.31	6.83	2.08	1.98	4.06	2.35	1.71	4.06	1.1
1 to 2 years.....	5.36	0.75	6.11	..	..	..	..	..	..	..
2 „ 3 „.....	5.62	0.90	6.52	..	..	..	..	..	..	..
3 „ 4 „.....	4.93	1.27	6.20	..	..	..	..	..	..	..
4 „ 5 „.....	4.41	1.26	5.67	..	..	..	..	..	..	..
0 „ 5 „.....	5.46	..	—	..	..	..	..	..	..	..
5 „ 10 „.....	4.70	1.12	5.82	..	..	..	..	..	..	..
10 „ 15 „.....	5.28	2.78	8.06	..	..	..	..	..	..	..
15 „ 20 „.....	4.30	6.00	10.30	..	..	..	..	..	..	..
Over 20 „.....	6.32	25.21	31.46	..	..	..	..	..	..	..
1 to 3 „.....	..	..	..	1.66	2.64	4.30	1.42	2.19	3.61	1.5
3 „ 5 „.....	..	..	..	1.20	2.10	3.30	1.34	2.27	3.61	1.1
5 „ 8 „.....	..	..	..	1.12	2.51	3.63	1.44	2.52	3.96	1.2
Over 8 „.....	..	..	..	1.84	2.70	4.54	1.65	3.56	5.21	1.4
Over 10 „.....	..	..	..	..	..	..	..	..	..	..

NOTE.—The three figures given for the year 1890 are those for Ben

TABLE I.—*Showing the Rates of Death and Invaliding among British Troops in India at various periods since 1846.*

Age.	Percentage of deaths in India at various periods and at different ages.														Percentage of invaliding from India.					
	1846 to 1857.	1867 to 1876.	1865.	1866.	1867.	1868.	1869.	1885.	1886.	1887.	1888.	1889.	1890.	1867 to 1876.	1865. ²	1869. ²	1885. ²	1889. ²	1890.	
10 to 15 years.	1.51																			
15 "	0.77																			
16 "	0.94																			
17 "	2.50																			
18 "	7.16																			
19 "	2.80																			
20 to 20 "	2.73																			
Under 20 "	..	0.88	0.91	0.33	1.36	1.28	0.80	0.77	1.58	0.81	0.67	1.21	{ 0.72 0.21 0.31 1.83 1.17 1.18 1.30 1.27 0.89 1.29 1.33 1.48 1.08 0.82 0.48 4.66 2.77 1.63	..	1.15	1.74	0.55	1.29	{ 0.81 1.08 2.51 2.74 2.36 3.88 2.41 2.59 2.62 2.02 2.04 2.55 3.41 1.23 2.41 4.00 2.45	
20 to 25 "	5.65	1.60	1.69	1.15	2.17	1.45	1.71	1.70	1.75	1.47	1.47	1.93	{ 1.17 1.18 1.30 1.27 0.89 1.29 1.33 1.48 1.08 0.82 0.48 4.66 2.77 1.63	12.58	2.33	4.22	2.45	3.16	{ 2.36 3.88 2.41 2.59 2.62 2.02 2.04 2.55 3.41 1.23 2.41 4.00 2.45	
25 to 30 "	4.90	1.89	2.92	2.06	2.45	1.70	1.95	1.27	1.45	1.51	1.56	1.49	{ 1.27 0.89 1.29 1.33 1.48 1.08 0.82 0.48 4.66 2.77 1.63	3.75	3.59	4.92	2.70	2.92	{ 2.59 2.62 2.02 2.04 2.55 3.41 1.23 2.41 4.00 2.45	
30 to 35 "	5.00	2.74	3.64	2.73	3.73	2.96	3.05	1.48	1.33	1.33	1.64	1.36	{ 1.33 1.48 1.08 0.82 0.48 4.66 2.77 1.63	3.61	4.21	5.27	2.91	2.66	{ 2.04 2.55 3.41 1.23 2.41 4.00 2.45	
35 to 40 "	5.06	3.37	5.27	4.12	3.90	3.84	4.47	2.31	2.05	1.74	1.43	1.57	{ 0.82 0.48 4.66 2.77 1.63	7.61	9.23	8.20	4.61	2.64	{ 1.23 2.41 4.00 2.45	
Over 40 "	..	5.48	6.64	6.22	4.80	5.66	6.89	2.72	2.11	1.05	2.70	2.66	{ 2.77 1.63	16.63	20.56	15.19	4.76	4.68	{ .. 2.45	
40 to 45 "	5.83																			
45 to 50 "	5.42																			
50 to 55 "	6.00																			

The columns for 1890 show three figures for each age. These are respectively for Bengal, Madras, and Bombay, in the order given. They are taken from the last Report of the Army Medical Department, that for 1890.

¹ Under 25 years.

² Madras and Bombay Presidencies only.

in India in different Years and after different Lengths of Service in India.

1887.			1888.			1889.			1890.		
Died.	Invalided.	Total loss.	Died.	Invalided.	Total loss.	Died.	Invalided.	Total loss.	Died.	Invalided.	Total loss.
1.86	1.58	3.44	1.62	1.37	2.99	2.65	1.53	4.18	{ 2.17 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	1.04	{ 3.21 2.61 5.08 4.09 3.31 5.98 3.35 3.63 2.98 3.71 3.37 4.14 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	1.28	{ 2.61 5.08 4.09 3.31 5.98 3.35 3.63 2.98 3.71 3.37 4.14 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	2.64	{ 3.63 2.98 3.71 3.37 4.14 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	2.54	{ 4.09 3.31 5.98 3.35 3.63 2.98 3.71 3.37 4.14 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	4.83	{ 5.98 3.35 3.63 2.98 3.71 3.37 4.14 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	2.30	{ 3.35 3.63 2.98 3.71 3.37 4.14 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	2.64	{ 3.63 2.98 3.71 3.37 4.14 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	2.54	{ 4.09 3.31 5.98 3.35 3.63 2.98 3.71 3.37 4.14 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	2.42	{ 3.71 3.37 4.14 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	3.13	{ 4.42 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	3.64	{ 5.34 3.14
..	..	..	..	..	..	..	..	..	{ 1.33 1.87 1.67 0.77 1.15 1.05 0.99 0.44 1.29 1.04 1.03 1.29 1.70 0.70	2.44	{ 3.14
1.50	2.53	4.03	1.53	2.34	3.87	1.44	2.92	4.36	{ 1.63 1.60 1.45	3.38	{ 5.01 3.48 5.16
1.16	2.31	3.47	1.35	2.39	3.74	1.43	2.98	4.41	{ 1.63 1.60 1.45	1.88	{ 3.48 5.16
1.28	2.13	3.41	1.25	2.53	3.78	1.66	2.70	4.36	{ 1.63 1.60 1.45	3.71	{ 5.16
1.40	2.96	4.36	2.19	2.63	5.82	2.02	2.28	4.30	{ 1.63 1.60 1.45		
..	..	..	..	..	..	..	..	..	{ 2.45 1.31 2.09	4.29	{ 6.74 2.29 4.53
..	..	..	..	..	..	..	..	..	{ 2.45 1.31 2.09	0.98	{ 2.29 4.53
..	..	..	..	..	..	..	..	..	{ 2.45 1.31 2.09	2.44	{ 4.53

for Bengal, Madras, and Bombay, in that order.

TABLE I.—Showing the Weekly Rates of Pay in the Army, and Weekly Wages in various Trades of Civil since 1557. Compiled from a variety of sources.

Year.	Infantry private soldier's weekly pay.	Infantry of the line.			Cavalry of the line.				Husbandman.	Artificer.	Carpenter.	Bricklayer.	Mason.	Weaver.	Miner.	Builder.	Cotton spinner.
		Sergeant-major.	Sergeant.	Corporal.	Sergeant-major.	Sergeant.	Corporal.	Private.									
1557	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s.
1593	4 8	..	..	..	..	..	..	..	2 6	3 9							
1610	..	..	..	..	..	..	..	..	3 5	4 6							
1651	5 10	..	..	..	..	..	..	..	6 10	7 6	..	..	..	..	..	..	..
1655	5 3																
1659	..	..	10 6	7 0													
1661	4 8	..	..	..	..	..	..	10 6	6 9	..	..	..	..	..	..	..	..
1682	5 3	..	..	..	..	..	..	..	5 11	..	..	..	..	..	..	..	..
1685	..	..	..	..	..	..	..	..	3 11	..	..	..	..	..	..	..	..
1725	..	..	..	..	..	..	..	..	5 4								
1730	..	..	..	..	..	..	..	..		15 9							
1751	..	..	..	..	..	..	..	..	6 0								
1770	..	..	..	..	..	..	..	..	7 4								
1771	4 0																
1792	5 10	..	..	..	..	14 0	10 6	7 0									
1796	..	..	..	..	..	..	..	..	8 11	17 3							
1797	7 0	..	12 3	8 6	..	..	..	..					
1800	7 0	..	..	..	..	..	..	..	..	18 0							
1801	7 0	14 6	11 0	8 4	22 3	14 0	11 5	8 9	10 0	..	..	..	..	..	..	18 6	34
1803	..	..	..	..	..	..	..	..	11 5								
1806	{ 7 0 8 2 8 9 }	..	12 10	9 4	..	..	..	..	..	28 0							
1811	7 0	17 6	12 10	9 4	24 6	15 2	..	..	{ 14 6 12 6 }	30 0	..	..	..	..	..	33 0	52
1819	..	..	..	..	..	..	..	..	12 0	33 0				..	..
1821	..	21 0	..	..	..	..	..	..	12 0	..	..	..	..	..	..	31 6	..
1824	..	..	..	..	..	..	..	..	10 0	33 0							
1829	..	..	..	..	..	..	..	..	11 0	33 0							
1832	..	..	..	..	..	..	..	..	12 0	33 0							
1833	..	..	..	..	..	..	..	..	..	..	24 0	24 0	24 0	{ 12 0 8 3 }	18 8	..	38
1841	..	..	..	..	..	..	..	..	9 6	..	..	..	..	..	..	29 2	34
1851	..	..	..	..	..	..	..	..	10 0	..	..	..	..	..	..	29 2	30
1861	..	22 3	..	..	25 8	16 6	..	..	10 6	..	..	..	..	..	..	34 6	34
1866	..	23 6	..	..	25 8	16 6	..	..	..	..	..	..	..	..	..	36 0	32
1883	..	..	..	..	..	..	..	..	..	..	34 0	36 0	29 10	{ 26 0 20 6 }	28 0	..	..
1892	7 0	35 0	16 4	11 8	37 4	18 8	14 0	8 2	..	..	..	..	..	..	..	..	..

Cotton spinner.		Average price of wheat per quarter.	
s.	d.	s.	d.
..	69	0	
..	54	0	
..	43	0	
..	39	0	
34	6	76	2
52	2	92	1
..	69	0	
..	58	2	
38	2		
34	0	58	0
30	0	53	11
34	0	51	4
32	0	49	11
..	41	7	
..	37	0	

TABLE K.—Showing Approximate Strength of Local Colonial Troops.

Colony.	Troops.	Remarks.
Canada	38,000	Militia.
Australia—		
New South Wales.....	10,000	Volunteers.
Victoria	5,500	
South Australia.....	2,200	
Queensland	5,000	
West Australia .....	..	Small Volunteer force.
New Zealand	9,000	Volunteers.
Tasmania	2,000	
The Cape	5,600	
Zanzibar.....	1,200	
Natal	1,800	
Mauritius.....	..	Small forces under 1,000 men each.
Ceylon.....		
Hong Kong		

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WEDNESDAY, FEBRUARY 15, 1893.

ADMIRAL SIR NOWELL SALMON, *V.C.*, *K.C.B.*, in the Chair.

MODERN WARFARE AS AFFECTING THE MERCANTILE MARINE OF GREAT BRITAIN.

By Lieutenant W. C. CRUTCHLEY, *R.N.R.*

It may, perhaps, be assumed that the interests attaching to this subject are great and far-reaching. Briefly it may be said that our merchant vessels are the great source from which our money-earning power springs, and also that they are indispensable to the efficient food supply of Great Britain. The importance of the subject must be my excuse for again bringing it forward here.

Previous papers have created a fair amount of discussion in this theatre, as elsewhere, and it is eminently satisfactory to know that those discussions have borne good fruit. The opinions here expressed by officers have been acted upon to a certain extent; and it is in the hope of yet further improvement that this subject is again brought to the front.

The points which still possess undue prominence are the urgent necessity for the partial arming of our swift merchant steamers on the long over-sea routes, and, secondly, the necessity of an efficient scheme for the whipping in of our scattered commerce on the outbreak of war, with an enemy powerful enough to trouble us on the sea.

And, as to the probable effect modern warfare will have on our merchant shipping, this will admit of little discussion; the modern gun has been brought to such perfection, and explosives of enormous power can be carried in such small compass, that at all hazards, raiding on our vessels must be brought to an end as speedily as possible, or the consequences to ourselves will be disastrous in the extreme.

This question of raiding on merchant vessels has of recent years been nearly always associated with the name of the "Alabama" and her consorts; it is, perhaps, natural that this should be so, as it was the last example of anything of the sort, but it cannot be considered by any means as a parallel case to an attack upon our commerce now, any more than recent Continental warfare with now obsolete weapons will help us to estimate what may happen in the future. Apparently this estimate is that the next great war will be more destructive and far-reaching in its effects than any which have preceded it; but that inference has to be drawn from past history.

So also with the lesson to be learned from the "Alabama." She was practically a sailing vessel, and so had the power of keeping the sea for long periods of time; also the vessels she preyed upon were sailing vessels, and one other point in her favour was that telegraphic communication was very inferior at that time, which gave her some advantages that it may perhaps be assumed no other vessel will have in future; this latter point must not, however, be lost sight of even now, for a destruction of telegraphic cables would tell against us far more than against any enemy at sea.

Moreover, as the "Alabama" had no base of operations to which she could send her prizes, she elected to destroy them; this may or may not apply to the raider of to-day. For, let our navy be as powerful as we all might wish it to be, it could scarcely be expected to blockade every port in an enemy's country; and it can scarcely be doubted that attempts will be made to take suitable vessels to the enemy's ports, with a view to their conversion and use against ourselves. That is one way in which steam has multiplied the chances of disaster to ourselves, for a vessel destroyed is done with; in the hands of an enemy she is a power for evil.

The great similarity, however, between the "Alabama" and her consorts and the raider of to-day is, that they may all be classed under the head of merchant vessels; then, as they would be now, they were hastily armed and irregularly manned, and, with every advantage against them, they succeeded in ruining for a time the sea trade of America. Whether that country will ever recover its sea trade is a matter which will affect us very seriously, although the mention of it suffices here; but the fact remains that four vessels sufficed to ruin that trade.

And important though that loss was to America, that country was in a vastly different position to that in which we should be under similar conditions; their carrying trade was merely an adjunct to a completely self-supporting country; they could, with no difficulty, manufacture all their war material; they were very far removed from any fear of famine, their country was, in fact, a great deal more than self-supporting; and, lastly, *their empire did not extend beyond their own shores.*

Now, let us contrast this position with that of the United Kingdom, in the event of modern steamers being turned loose to prey on our commerce.

Without any attempt at absolute accuracy, it may be stated roughly that we possess 70 per cent. of the carrying trade of the world. What the value of that trade is to this country annually must be left in a great measure to individual imagination, and it would be very difficult to estimate it with any degree of precision; but it cannot be disputed that at whatever figure it may be placed, it will represent an enormous sum, without which the nation could not meet its liabilities.

In the course of the many arguments which have been put forward on the question we are now discussing, the endeavour has been made to show that the lesson furnished by the Confederate war vessels is one

which does not apply to us, inasmuch as the damage wrought by them was on sailing vessels only, and that our sailing tonnage would be laid up on the outbreak of war. This argument is not a good one, for the laying up of sailing vessels would necessarily throw more work on the steamers. *We alone* possess the steamers necessary to carry on the trade of the world, and in all probability, if we are very hardly pressed, we shall owe our salvation to that fact; for as it is extremely doubtful whether any transfer of vessels would be recognised by a belligerent nation after the outbreak of war, we find ourselves face to face with the conviction that our trading vessels must keep the sea, or our country starves, the trade of the world comes to a standstill, and eventually leaves us for ever.

Of course it is possible, and not unlikely, that if we were very hardly pressed, America would see its way to offer as many inducements to its people to acquire British-built vessels as it now puts obstacles in their way. It is now very evident that they (the Americans) are bent on regaining some of their lost power at sea; and if that were accomplished, by our inability to take care of our property afloat, they would doubtless claim that it was little else than retributive justice.

For the purpose of this argument it will be assumed that, irrespective of hostile men-of-war, which it is presumed our own men-of-war will satisfactorily account for, thirty fairly fast merchant steamers are at the disposal of the Power or Powers resolved upon trying conclusions with us upon the sea. France and Russia combined possess about 1,000 steamers, and taking into consideration the steamers of the Messageries Maritimes alone, it cannot be said that thirty is at all too great a number to assume as being used against us.

These vessels need not be necessarily "Tentonics," or "Cities of Paris," but simply vessels with large coal capacity and, we will say, an extreme speed of sixteen knots; without doubt they would be fully coaled up, and have each, say, four 5-in. guns, and the necessary ammunition and crew.

With nearly three-fourths of the trade of the world to amuse themselves with, the question is, How long would it be before these vessels were caught, and what amount of damage would they have done in the meantime?

In attempting to estimate this, and taking into consideration the damage wrought by the last raiders on commerce, it must be remembered that traffic at sea has increased enormously of late years, and that on certain routes the seas are simply crowded by vessels under our flag.

It must also be borne in mind that these vessels will have a coal capacity which will render them independent of any coaling station, or base of operations. They will be enabled, if necessary, to steam round the world without coaling, and their power for destruction, until they had *to fight*, would be incalculable.

I use the expression to fight, because, were a merchant vessel to chase another armed with a stern gun, she would in all probability receive such damage as would shorten her career very considerably.

With what vessels is it in contemplation to catch them? Have we sufficient cruisers to undertake the business; or is it proposed to do so with the vessels now on the Admiralty list, when they have been taken from their respective trade routes and equipped for that purpose? I scarcely imagine any officer here present will contend that we have cruisers enough of the "Blake" and "Blenheim" type for this purpose. I must suggest that for this work on the open sea large vessels will be required, and they must be able to maintain a big speed easily; short vessels with low freeboard, that will bury themselves in a head sea, are scarcely suitable for doing good work with.

If, on the other hand, it is proposed to catch them with the vessels on the Admiralty list, there will be a terrible loss of time before they can be equipped; and then arises the question, How many will you send, and where will you despatch them to?

To send one ship to look for another which has a roving commission is rather a hopeless task; they (the auxiliary cruisers) would presumably make for where the shipping was thickest, but to my fancy by the time they got there they would find the birds flown to a less frequented part of our terribly long sea routes.

If there is one lesson which has been taught and emphasized in this theatre for years past, it is the value of history as illustrating the probabilities of future warfare; this will scarcely be controverted.

Now the American trade never even assimilated to ours of to-day. It was sailing tonnage only, and neither pursuers nor pursued were capable of rapid movement such as would now obtain; and it will be admitted that increased rapidity of movement will give greater facility for increased destruction, in precisely the same manner that a man with two guns in a warm corner can kill more than with one only. It must be borne in mind also, that the proportion of Federal war vessels was greater in comparison with the Confederate raiders than our own navy and auxiliaries would be with the number assumed as likely to be turned out against us; and then, in looking at the facts as they now are, we must decide what are the chances in favour of our being able to prevent a wholesale destruction of our merchantmen.

But, as has been stated, a merchant vessel engaged in warfare is always liable to receive damage which will disable her if she attempts to chase an armed vessel; this will apply equally to whether one of our auxiliaries chases an armed raider, or whether the raider chases one of our steamers on her ordinary trade route which has been supplied with stern guns.

This latter point was very strongly put by Captain FitzGerald at the Institute of Naval Architects some years ago.

In the recent discussion here on the Naval Prize Essay, it was asked whether, in the warfare of the future, merchant vessels were liable to be torpedoed indiscriminately? I do not think the question was discussed. To a great extent naval officers are interested in the mercantile marine—necessarily so, indeed. But is there not, perhaps, a tendency to trust that Providence will be merciful to it, and to hope

that it may be so? Now the man who has spent a lifetime in the merchant service looks at this thing from an entirely different point of view. He knows all its little peculiarities, and is scarcely content to accept Providence as his sole stock-in-trade when the emergency we are now discussing arises. Knowing, as we all do, that no man-of-war is capable of keeping the open sea for long periods of time, for many reasons (of which, perhaps, want of coal is the principal), he looks with an eye of suspicion on fixed trade routes patrolled by men-of-war as a means of keeping the sea clear of raiders, when men-of-war are not in far greater excess of requirements than we have them, or are likely to possess them in the immediate future.

And it would appear as if this question of the value of protected trade routes as against convoys is somewhat on these lines. Will you endeavour to hold a long line of communication by many weak detachments which are liable to attack by an enemy at any point of the line; or will you not rather, the means of transport being no object, keep a movable column together which is capable of absolute defence against any force likely to be brought against it? I must confess that it appears scarcely to admit of argument.

With a protected trade route it means that from the Polar regions to the Equator we have to defend such a line of communication as has never yet been held, and which is liable at any time to attacks in each and all of its weakest places. To endeavour to do this efficiently with our present number of cruisers is manifestly impossible, and it would be satisfactory, as a test, to send one of them to cruise between Finisterre and Madeira for a month with, say, instructions to steam daily 300 miles without putting into port.

The necessity does not exist for any other nation to have such vessels as ourselves if the protected trade route is to be attempted. The ordinary war vessel is supposed to have fair moving power, and men-of-war of all nationalities are more or less hampered by the endeavour to make them comply with conditions which will suit all and every circumstance; as long as they are opposed to one another this is all right, and as fair for one as the other; but, to efficiently patrol a trade route, they require speed and endurance for an unlimited time, which it is, to say the least, doubtful whether any one of them at present possesses.

It will be assumed, for the purpose of argument—

1. That our men-of-war cruisers at present are not in excess of our requirements for blockade and scouting purposes, and also for keeping clear of enemies the entrance, and immediate approaches, to our home and principal ports; to keep even 50 miles from our shores free of an enemy will be no light task;

2. That there are, therefore, not enough of these vessels to patrol with any approach to efficiency the main trade routes of the world, which must necessarily be traversed by our slower steamers, if it is decided to adopt that plan in preference to vessels steaming under convoy;

3. That, given two merchant vessels of fairly equal speed and ability, the possession of one piece of modern ordnance by one of

them utterly destroys the comparison and gives the unarmed vessel, without hope of resistance, to the other either for capture or destruction.

The first of these propositions will in all probability be accepted. The second is scarcely likely to cause much argument; but with regard to the third and last one, the case is different, and herein lies the entire question; and it is on this point only that any satisfactory settlement of the safety of merchant steamers can rest.

The arguments that can be used against any scheme for arming merchant vessels to take part in their own defence are three only; in its favour there are many, but the adverse ones may be summed up as—

1. The questionable right to fire a shot in self-defence only, or to be in possession of arms.

2. The extra weight of those arms being always carried; this is the so-called shipowners' argument.

3. The want of training and ability on the part of officers and men to use modern weapons in their own defence.

The first of these objections has been argued in this theatre years ago, but never, so far as my knowledge serves me, with any absolute finality. Perhaps, however, by this time something definite has been decided which may be elicited in the discussion which I hope will follow.

To a greater or less extent merchant vessels always have been armed until quite recently; certainly long, or many years, after the date of the Declaration of Paris vessels were well armed that traded to the China Seas; and, speaking from memory, long after that date guns and ammunition were supplied by the Admiralty to vessels which complied with certain requirements. But the astonishing thing is that the larger and more valuable vessels have become, the less care appears to be taken of them, nor are any facilities afforded them in the case of unforeseen accident. Vessels might be mentioned by the score, some of the finest afloat, habitually trading past a coast inhabited by barbarous and hostile natives, and yet there is not a musket on board them, supposing they by any mischance went on the beach and were attacked by natives. That, however, is beside the question, but merely mentioned as showing the indifference with which the entire question is treated. The point to be made is that if it was legal to carry arms in the sixties, and, furthermore, arms supplied by Government, it is legal to do so now; if it was not legal then, the subject would be all the better for modern reconsideration.

As to the second adverse opinion on this matter, or what may be termed the shipowners' argument, it could be dismissed in far fewer words were it advisable to do so; but as it is not, it will receive more explanation, perhaps, than it may merit.

To put it as briefly as possible, and not to go into detail, it will be assumed that 4·7-in. Q.F. guns are selected as the armament for mail steamers, although they are in excess of requirements, as 4-in. guns would be quite large enough; of course the extra bursting charge of the larger gun would be much in its favour, and it is

upon that point only that it would meet with much consideration for the purpose of this paper, as the armament is to be considered as strictly a defensive one. Two guns and mountings will be considered as 10 tons, spare gear and 200 rounds of ammunition 10 tons more, at the utmost computation. With a vessel of 4,000 tons gross tonnage this would mean an extra immersion of half an inch; double the weight here given and say it means an inch. Is it seriously worth talking about, when the vessel in question usually loads moderately heavy cargoes only, and is seldom down to her marks? Assuming, however, which is very improbable, that a vessel selected for this purpose did load quantities of dead weight, there are very few trades where the constant carriage of 20 tons would mean the loss of 50% per annum, and, in all probability, in a passenger service this would far more than recoup itself by the popularity it would ensure.

The one real difficulty which stands in the way is the one of initial cost; in other words, who is to provide the weapons? And unless the scheme finds advocates in naval officers, its chances of success are minimized. Knowing as I do that many of my friends in the Service regard it favourably, I do not look at it in by any means a hopeless manner. One thing may be regarded as certain, and that is that shipowners will never bear the initial cost, unless it be after the outbreak of war, and they discover, when it is too late, that they can do a more satisfactory trade with vessels able and willing to take care of themselves. This being so, it is almost unnecessary to go into the question of cost; but, in all probability, the entire outfit could be provided for something considerably under 2,000% per ship, and that appears to be but a small percentage upon a vessel and cargo worth, say, one-quarter of a million of money. Say that the cost of equipping fifty vessels on the long over-sea routes came to 100,000%; what is that sum to the resources of a country with such interests as ours at stake, that is supposing Government would step in and supply the requisite arms? It would be, however, but reasonable to ask, in that event, what services, if any, could be rendered by these vessels in exchange for the means of protection?

The British shipowner of to-day is a 19th century production exclusively; he can see clearly in all ways concerning shipping but this one, and that is that the defence of his property at sea is a matter which does not concern him; he pays his taxes and expects to be protected. If he would study the subject at all (of course there are exceptions), he would see the absolute necessity for his own initiative in the matter, and recognise that a trade such as ours entails certain sacrifices to retain it. We have never in modern times been put to any effort to retain it in the face of serious opposition, and he fondly hopes it is to be our heritage to all time, through some mysterious agency other than physical force. That the reign of the latter is over does not, however, appear to be at all certain, and many considerations connected with shipowning are ripening day by day, which will go far to show that our merchant service is a most important part of our national economy, and that both the questions of manning and arming are pressing their claims to be considered.

The question of manning is one which does not at present concern us here, and these last few remarks have been made in the hope that when naval officers recognise more fully the need for the co-operation of the merchant service with them, shipowners will not bring forward unnecessary and imaginary difficulties where none exist.

It will be quite fair to assume that vessels of the best class of merchant steamers are likely to prove very useful auxiliaries to the navy in the event of war, and there has been a great unanimity of opinion on this subject amongst naval officers, both in this theatre and elsewhere. One opinion will here be given as representative, that of Sir Michael Culme Seymour: he said, on the authority of Sir Geoffrey Hornby, that "the 'Oregon' could get information from anywhere," and further, that Sir Geoffrey was very strong on that point.

The argument must, I think, be on this wise: that the "Oregon" was a good useful ship, as long as she could take care of herself, by her heels or otherwise; but when another similar vessel, armed and hostile to her, appeared on the scene, her usefulness disappeared from our point of view, unless she was put in a position to say to her adversary, "Yes, you may sink me, but you will go to the bottom too;" and as our resources are immeasurably in excess of those of any other nation where ships are concerned, we could afford to play at that game until the others were tired.

The inference to be drawn from this argument is that raiders coming across an armed merchantman would not tackle her if their object were plunder only, as they could not afford to risk losing their ship; if, on the other hand, they meant destruction pure and simple, they would have to pay dearly for all they did. It is evident that the argument applies with greater force, the more powerful and less cumbrous the means of destruction become.

I leave out any question of torpedoes in connection with the destruction of merchantmen, as their cost is considerable, and, moreover, their use appears to be unnecessary, save under exceptional conditions. Dynamite or guncotton exploded under the bed-plate of any steamer's engines would not leave much to do in the way of very efficient destruction—the crew of the steamer at that time being, perhaps, rather busy about their boats.

In the course of the same discussion from which I have quoted the remarks of Sir Geoffrey Hornby, Lord Brassey, speaking of merchant auxiliaries, says, "There are great functions of looking out, reporting, and gathering information, for which these ships would be exceedingly well adapted," and I scarcely think sufficient importance is attached to this prospective service, or care taken to organize the vessels in such a manner that they will be available on the immediate outbreak of war.

All this is part and parcel of the one great subject. The ships are there, the men are there; they could, with no extra expense, be doing habitually, and familiarizing themselves with, the work they would have to perform in war-time; but for want of the formulation of some plan of habitual intelligence-giving, they are likely to lack much of their utility, until some time after the outbreak of war, supposing

that there are then enough of them left to do the work. On the other hand, if they were put in the position of security here advocated, and scattered here and there along the trade routes of the world, it would go far to bring raiding by makeshift vessels down to its minimum limit.

It appears to be a firmly fixed idea in naval circles now, that it will be possible, under any conditions, to maintain intact the Suez Canal route, and cable communication throughout the world. It would be presumptuous on my part to question the accuracy of this belief, but it may, perhaps, be admissible to glance at the possibility of the alternate trade route being adopted in a hurry, and to ask also how, in the event of telegraphic interruption, news is to be diffused to our many important centres of interest. And the point I wish to see made clear is, by what means, were the Canal to be blocked to-morrow, is the trade from the East to be diverted to the Cape route? Have we facilities for giving intelligence, or have we any means of coaling in Table Bay?

Personally I am of opinion that it will be found necessary to run lines between certain places secretly, and have their ends at sea in places known only to ourselves; that, however, is beyond the scope of this paper, except in that it would be done by the ordinary telegraph steamer most probably. But as apart from this, by no other means can any plan for the dissemination of news be carried out, save by the wholesale utilization of our mail steamers on some well concerted plan. It is not asserted that this is not in contemplation; but the point I desire to advocate and urge most strongly is that a system of acting in concert by mail steamers with vessels of the Royal Navy, and the habitual transference of news, should be inaugurated *now*; that the tie between the navy and the merchant service, which has grown so wonderfully of late years, should be strengthened by the adoption of an improved method of signalling and communication; and that by no other means can this be so well accomplished as by adopting the measures here advocated.

The third of the so-called arguments against the arming of mail steamers, commonly used, is the want of training, both on the part of officers and men, and their inability to handle modern weapons. I have mentioned it because I read it seriously advanced as an argument against the views here held, by one of the leading shipping papers, and the contention to my mind is by no means sound.

Rudyard Kipling has described one class of vessel in the merchant service:—

“ With her load-line over her hatch, dear lass,
And a drunken Dago crew,”

and it is scarcely necessary to remark that we are not here dealing with that type of vessel, but with mail steamers that, in point of discipline, leave little to be desired. I do not think I shall be contradicted if I assert that, once at sea, the crew of a mail steamer will do anything they are told, and that disorder is a rarity among them. I think it will be admitted that the Royal Navy has made its mark on

the merchant service, through the agency of the reserve men, and that, consequently, it is scarcely possible to discuss any such question as we are now doing of merchant shipping in war time, without some mention of this force.

In so doing I am treading on very delicate ground, but having no other resource shall, in this instance, trust in Providence.

On previous occasions I have mentioned various shipping companies by name, taking into view their special fitness for some particular work, and although that has been done, there was not then, nor is there now, any or the smallest intention of personality. A company is simply mentioned as a typical one, which would be suitable under favourable conditions for carrying out the reforms or plans here indicated.

The Peninsular and Oriental Company is probably the company that all would agree in granting precedence to in the merchant service of Great Britain, and I heard Sir T. Sutherland, the Chairman of that Company, assert last year that one-fourth of the entire number of Reserve officers sailed in those vessels. I am speaking from memory only, but am fairly certain.

One-fourth of the officers of the Reserve is a very considerable leaven even for such a service as the P. and O., and I would submit that it appears absurd to have subsidized ships officered by officers, and partially manned by men trained at the public expense, and then sent to sea in a condition so defenceless as to be liable to fall a prey to the most wretchedly armed raider having speed enough to get alongside them, or able to take them unawares, when these same men and vessels are intended to take part in the defence of our commerce after the outbreak of war.

We hear it said that we are to be prepared to make torpedo attacks, &c., on an enemy's fleet and harbours the first night after war is declared; if that is to be the sort of pace at which the warfare of the future is to begin, does it not at least seem probable that an enemy would be similarly prepared to touch us on our most vulnerable spot? That must surely be admitted, and as things at present are, we expose to the risk of capture, before they can reach port, the very vessels on which we rely to supplement our cruisers; the thing appears to me so self-evident that it is unnecessary to dwell further on it.

There are, perhaps, two points that may be alluded to here. The first is one that was mentioned to me at the Admiralty years ago when I first tried if anything could be made of the 1863 circular. It is this, that were we to arm our mail steamers, foreign nations would object, and say we were increasing our armaments; by this it would appear as if in some respects we are hampered by considerations which affect no other nation.

Take the present case of France and Germany. Does any consideration for the feelings of her neighbour prevent either of those nations from doing all in her power to devise additional means of offence or defence; or does it seem at all probable that any remonstrance on either side would receive serious attention? On the other

hand, either would contend that they were neglecting their vital interests if they omitted the smallest detail likely to benefit them in the smallest degree on the outbreak of war.

And it may be said that the habitual presence of passengers in these ships is one reason why they could not fight. Certainly no one would seek a fight with passengers to any great number on board, but most people would sooner risk the chance of a running fight and eventual escape to the certainty of a prison or an unlimited time spent at sea in a ship's boats. If war were imminent or likely, people would be chary of travelling in large numbers; only those obliged to do so would travel, and as there is no certainty that vessels will not be torpedoed indiscriminately, I fail to see that the condition of passengers could by any means be worse through being in a vessel able to some extent to protect herself. In the old French wars the presence or otherwise of passengers was never considered, save in the way of making them useful, and I suppose even now they could get some protection from gun fire below the water-line.

I do not see that damage to the upper works of a steamer by shell fire need necessarily prevent her getting to port if she could stop her pursuer by holes in his bow; at the same time I grant that a long steamer pitching in a head sea offers a mark when she lifts to a pursuing ship which, at short ranges, could not possibly escape being hit frequently.

It remains now to speak of the question of communication, or rather, the lack of efficient means of communication, should it be necessary to take steps to whip in our scattered commerce.

If the Suez Canal route is to be kept open in war time, these P. and O. steamers on their own route and doing their own work would be capable of doing enormous service. Running as they do habitually over what would necessarily be a big battlefield, it would be hard to exaggerate the importance of the work they might do, were a system of regular communication adopted at once. Almost the same importance attaches to the Cape Mail service, perhaps more so, should the Suez Canal be blocked; but it will be little use trying to arrange these matters after war is declared.

As to the system of signalling to be adopted, we appear to be as far from the solution of that matter as ever. Many have been the schemes devised, and it would appear as though elementary points were not even decided on. It is a curious thing that out of all the many and varied suggestions offered, not one can be decided upon as possessing the requisite elements, which are applicability to both day and night—simplicity and speed. Personally, I have advocated the Morse system, which, if difficult, would at least have had the merit of finality for many years to come; but the suggestion has been met with so nearly unanimous a torrent of abuse from many quarters of the merchant service, that I fear the chance of its adoption is a very remote one.

But will not the powers that be take upon themselves to decide this question, and say which principle or system is to be adopted for the signalling of the future, and let us have it at once, to do the best we

can with? Were this done, any expense incurred by fitting mail steamers with the means of self-defence would be amply repaid by the services those vessels could render on an emergency arising, even whilst in the pursuance of their ordinary avocation.

I have in previous papers roughly sketched out what the plan of co-operation would be, and see no reason now for making any decided alteration in it.

I had intended to make some remarks respecting the Naval Reserve, and the best way to secure its greatest efficiency, but have come to the conclusion that this theatre is not a fitting place to do so. This force, however, it may be said, is capable of better work than is even now got from it, as will be seen when it is once placed on a fair and intelligible footing.

Vice-Admiral H. F. NICHOLSON, C.B.: I shall not attempt on the present occasion to do more than make what, perhaps, I may be permitted to call a running commentary on the most interesting paper that has been read to us. The subject is an all-important one. It amounts to this, the organization of our trade routes; and when we consider that along those routes, by some method or other, must pass that enormous mass of commerce, without which, as Lieutenant Crutchley justly observes, this country must become bankrupt, even if we are not starved by the non-arrival of bread stuffs to feed our population, everyone will admit this is a question which ought to receive most serious consideration. It may possibly be that this matter has been thoroughly worked out, but I think it is very important that such plans as do exist should be given to the nation at large. I admit that you cannot give them to the nation without giving them also to others who might at some time be our enemies, but I think the advantage would be very much on our side, because what we have so greatly to fear is the panic and disorganization which will seize upon the whole mercantile population on the first outbreak of war. If this were obviated, and if we had time to carry out all the arrangements made to meet the first stress, the event, probably, would not be so serious as many of us imagine. Would it not be very desirable, then, that on war breaking out, each of the commanders of our merchant steamers should know really what is the great principle which is going to be adopted to bring our commerce along the great trade routes. Are we to trust to patrols? Are we to trust to convoys? Or, are our merchant ships to be allowed to make the best use of their own powers of speed for escape? These are three questions to be considered, and there is one other which I shall propose to deal with later on. I think, as regards the first question, there can be very little doubt that any attempt to patrol these vast routes will only lead to failure. Suppose we had twice the number of fast cruisers that our enemies had—and that, I think, is taking a very extreme view—what would be the mission which these cruisers would have thrust on them? There would be the enemy's cruiser, who would lurk about at certain points of the trade route, with his engines stopped—his fires ready undoubtedly, but his engines stopped, watching for his prey, waiting for days, or even months, with but little expenditure of coal. On the other hand, what would our cruisers have to do? They would have to be racing up and down, patrolling the trade route, to find the enemy's cruiser and attack it. I believe I shall be quite within limits if I say that the consumption of coal on the ship that has to patrol would be in excess of the coal used by the other by about three to one; and as I think you will all admit that the power of the cruiser is the limit of coal endurance, we shall not have to provide twice as many ships, which I previously supposed to be a fair proportion, but we must multiply this number by three, because they will use three times as much coal. Therefore, to put us in a decent state of security, we must be prepared to put on these trade routes six times the number of cruisers possessed by the enemy. That is a very serious matter. Lieutenant Crutchley has also raised this question: Do naval

officers consider that we have sufficient ships of the "Blake" and "Blenheim" class? We have only two; that is not enough; and I should think, possibly, before any naval officer, or any expert would be satisfied that we can protect our trade routes efficiently by patrolling, he would demand that we should have about 20 "Blakes" or "Blenheims," or somewhat similar powerful cruisers. We could not possibly do it with less. That would amount to about ten millions. Then we have to maintain these vessels, and, in fact, the sums of money we should have to ask the public for would be impossible. So, I think, if we take a practical view, we must admit the impossibility of patrolling the trade routes. We might protect the ships when they come into narrow waters, but as for patrolling in the sense of a policeman patrolling his beat, the thing is absolutely impossible. I do not know whether I shall be supported in my conclusion, but it is a matter I have thought over, and that is the result I have been obliged to come to. Then we come to the next plan, and that is convoys. I think it would be wise to let it be understood by merchant vessels that on the breaking out of war they will receive telegrams at different points, informing them of the rendezvous where they might receive the protection afforded by a convoy, and if these convoys were arranged to sail at certain intervals of time they might satisfy the conditions of trade, and the conditions of providing eatables for the nation. But, undoubtedly, there is another solution of the difficulty, touched on by Lieutenant Crutchley in a very able manner, and that is the partial armament of merchant steamers. Their status would be affected by the Declaration of Paris, and I think we must be surprised when a gentleman of Lieutenant Crutchley's intelligence and industry has to tell us that he cannot understand what it means; that is to say, whether vessels are by it permitted to fire a single shot in their own defence without being condemned as pirates. It appears to me that the sooner this is settled the better, because, if the decision is in our favour, we shall be in this position, that for a very moderate amount of money we shall be able to partially arm the *élite* of our merchant vessels (dormant commissions having been previously sent to the Commanders-in-Chief on foreign stations) with a few of the most modern Q.F. guns, and then if we have made the necessary preparations beforehand we should be in a very strong position. Our merchant ships should become, when war is declared, an integral part of the country, and, in my opinion, the Government is just as much bound to protect them and mount guns on them as to erect forts along the coast of Great Britain, and more so, because the loss that will be sustained by the interruption of our traffic will be something enormous and fatal to the country. The cost of equipment for one vessel, Lieutenant Crutchley tells us, would be probably about 2,000*l.*, so that, supposing we had 200 of such equipments spread all over the world, it amounts to a mere flea-bite. When war is declared, vessels could rendezvous at certain points, the Cape, Hong Kong, &c., and ship these armaments, and then they would, in point of fact, convoy themselves, being placed in a legal position on receiving the dormant commissions already referred to. This, then, is the proposition which I think the lecturer wishes to introduce to you this afternoon; it is that merchant vessels partially armed should make a sort of joint convoys. Sea-going raiders, lying about seeking whom they may destroy, would be very chary indeed of attacking half-a-dozen merchant ships coming together if they had any suspicion that some of them had guns. I am entirely with Lieutenant Crutchley in relation to everything he said as regards the Reserve, and I am sure my brother officers most cordially appreciate the great national service which is performed now, and will in future, in all probability, be performed by the Royal Naval Reserve. They are officers and men who deserve well of their country, and they ought to be encouraged in every possible way. I do not agree with the idea that, supposing guns are supplied generally to merchant ships, the crews will not be able to work them. What we want for these modern guns is the most simple drill, and any intelligent man on the engine-room staff should be able to handle a modern gun very efficiently; there is no difficulty about it at all. We have recently introduced most excellent range-finders, that anyone can use, and with one intelligent man on board, which, surely, it would not be difficult to supply, I see no reason why every ship should not be able to work its guns satisfactorily. I feel convinced of one

thing; the foreign cruisers looking about, as they imagine, to prey on our commerce, if they every now and then found they caught a tartar, and got a shot into their bow, would become very chary what they were about. As regards signalling, it is a most extraordinary thing to me that a matter so very simple should not be arranged, and an efficient system of signalling adopted between the Royal Navy and the merchant service. Whenever I am at sea I never pass a merchant ship without signalling, and I generally get a very satisfactory answer. As regards the Suez Canal, Lieutenant Crutchley seems to think naval opinion is that it will be kept open. I have always been under the impression that in naval opinion it would be shut, and that the only route would be round the Cape. I cannot conceive that any nation would hesitate to block the Canal (and it is very possible to do so) if it suited their purpose. As regards telegraphic communication, I imagine the telegraph cables could be cut very easily.

Admiral LONG: I wish to tender my own thanks to Lieutenant Crutchley for the trouble he has taken to bring this subject before us. With regard to the Royal Naval Reserve, I think that no one can doubt its great value and importance, and I should be inclined to echo what was said by Sir Geoffrey Hornby the other day at Aldershot apropos of the Volunteers, that he felt himself as a subsidized member of society put to shame by gentlemen who came forward voluntarily to do the work. In the year 1880 a paper was read here by Sir Donald Currie on the subject of the adaptation of merchant steamers to war purposes. It excited considerable interest in my mind, and I looked the question up a good deal. It appeared that previously to 1853 there had been a clause in the Postal Contract by which merchant vessels which were subsidized to carry mails were to be armed in the event of war, but about that time some important experiments were carried out in the "Excellent" with regard to the effect of firing at iron structures, and the result of those experiments was such that it was declared that no iron ship was fit to go into action, and the clauses referred to were then expunged. That is rather a remarkable circumstance considering that now they are all steel ships, both men-of-war and merchant ships, and with respect to their unprotected parts do not differ much from the ships that were at that day rejected, except as regards subdivision. I remember one of the vessels selected by preference as being fit to be armed in those days was a wooden vessel belonging to the Cunard or West India Mail Company, the "La Plata." I quite agree that to send one ship to look after another that is roving the ocean is to send her on a very hopeless task. I do not think I need say anything about the patrolling, for what Admiral Nicholson has said I think rather knocked that on the head. Lieutenant Crutchley says that naval officers are but moderately interested in the mercantile marine. I think perhaps we should remember that the Navy is not alone kept up for the protection of the mercantile marine; it has a further and more important object in the protection of the country, and therefore, although the protection of the mercantile marine must always be a very important thing to this country, at the same time I do not think it occupies the first place. Every merchant ship is the result to a certain extent of private speculation. No doubt what the shipowner says is not that there will never be war, but that there will not be war while that ship is paying—that the ship if she lasts a certain number of years, not in any case a very long period, will pay him. That is what he looks to, and although the external trade of this country is of vital importance to the livelihood of the people in it and it is also of great value to the country—something like 90 millions per annum—I think it is not altogether a public matter, but, like the agricultural and other interests in this country, it is an interest which is to a certain extent of a private character—not entirely of public interest. Sir George Tryon in his writings on the subject has pointed out that in the event of our trade being interfered with we might reasonably dread a revolution in the country, owing to the great trouble it would bring upon the labouring classes; but we must not forget that Napoleon the First in the palmy days of his power, when he had the whole of Europe at his feet, was unable to prevent trade taking the course he wished to divert it from. He was animated with great hate to this country and was desirous of crippling us on the sea, but, as is very well put by Captain Mahan, he could not do it, although he tried his utmost and had all the countries of Europe at his command, because the interests of private

individuals were so great that with bribery and corruption, and one thing and the other, what was wanted was got in. I do not think there is any power on earth that could prevent the food stuffs and raw material entering the country, although they might raise the price of it. Then we come to the "ordinary war vessel," which is supposed to have "fair moving power." I think that is a point naval officers must rather prick up their ears at, because there is no doubt that as the Navy is kept up entirely for war, the conditions under which it is to act are not familiar to us. I have been forty years in the Navy, and out of those forty years there has never been a time when the real conditions of naval war between great maritime Powers existed; therefore, there is not one of us who knows from experience what those conditions are. I have seen it actually said that a ship of war only required to go at high speeds for a short time, and on very few occasions. Of course, that is entirely false. That means in peace-time. You do not want men-of-war in peace-time; you want men-of-war to act in war-time, and the man-of-war will have to do then what the merchant ship has to do in peace. It is exceedingly important that we should in forecasting the requirements of our men-of-war as regards propulsive powers and sea-keeping qualities be guided to a great extent by the mercantile marine, what they are doing, what their ships are built for, and what they find suitable arrangements. We have seldom the means of simulating war conditions. We endeavour to simulate them as much as we can occasionally and whenever the country will afford the money to do it—about once a year for about ten days—but at other times we do not see much of what are likely to be our war requirements. I should like to say one word about the arguments that can be used against putting guns into merchant vessels—first, the question of the right to fire a shot in self-defence only. I believe there is no doubt merchant ships have a right to fire in self-defence just as much as I have to fire a shot at a fellow who comes into my house. It is not a question of right, it is a question of expediency. If you are in command of a merchant steamer with a whole lot of passengers on board, it becomes a question whether they will gain anything. In this argument it is implied that the guns which the vessel is to fire, and which I admit would be very good guns for this purpose, would obtain the superiority over the enemy, would make a hole in her bow and stop her. But we must also take the other side of the question. I have been looking at one or two of the cruisers, one being the "Piemonte," and I see she would be able to fire three or four guns ahead. Now you with your two guns firing astern would at once become a mark for three guns firing ahead, and those three guns firing ahead would be in the hands presumably of experts and gunners; therefore, the balance of chances under those circumstances would certainly appear to me to be with the man-of-war. So that although I quite think a merchant vessel armed as advocated might possibly, if she were fortunate, stop her pursuer, at the same time I think it is more a question of expediency than of right. On the second objection as to the "extra weight" I quite agree with the lecturer. On the third objection, the "want of training and ability on the part of officers and men," I quite agree with what Admiral Nicholson said. I was very glad to see a letter in yesterday's "Times" from Mr. Scrutton saying the British seamen in the mercantile marine of this country amounted to 180,000 men; that is a very good piece of news to me. I think Lieutenant Crutchley makes a decided point about the merchant ship having arms on board. It is news to me that they do not carry arms. I certainly thought they did carry a certain amount of arms, but I think it is a matter of great importance that any British merchant vessel going to distant parts of the world, especially to the Chinese coast and places like that, should carry arms. Not very long ago a British merchant vessel was seized by her own Chinese crew through the intervention of pirates, and it does seem to me that Lieutenant Crutchley has put forward a very important point when he says that vessels ought to carry arms on board, and it might be a matter to consider whether these vessels, whose armament is in store, might not as well carry it on board; I think it would probably be better. With regard to torpedoes I rather think I put the question myself about that, but, of course, for a torpedo to be fired at a merchant ship the vessel firing must be very close. She should not be more than 800 yards distant, and presumably long before she got to that distance she would have done the business with her guns, unless firing at night.

The question I put was really with a view to vessels passing up the British Channel at night. Take the case of a torpedo boat lying out in the Channel. A large vessel comes past. She does not know what she is: is she to fire at her or not? If she sings out the ship will fire at her. That is the idea I had in my mind. With regard to the Suez Canal, I presume this really is a matter that would have to be decided by actual fighting, but, whatever view may be taken, no one can doubt that Lieutenant Crutchley is wise in saying the alternative route should be fully considered. I have no doubt it is fully considered in these days when we have a Naval Intelligence Department. I should like cordially to endorse what Lieutenant Crutchley has said about the discipline of the merchant service. I had the good fortune to go across the Atlantic in the "Majestic" the other day, and to come back in one of the Allan steamers. I was exceedingly pleased to see the way in which everything was done, and the discipline of the crew. It appeared to me everything was done very much in the same way as it would be in a man-of-war. I have no doubt that is the case in all our great mail steamers. As to the expediency or otherwise of a mail steamer with a number of passengers on board beginning to open fire on an enemy, of course there are a great variety of cruisers, and, no doubt, if it was only a third-class cruiser she might get away, but it would be a serious matter to put it in the power of the captain of a mail steamer to subject his passengers to an enemy's fire by which they might suffer very much, and possibly no good might come of it. I think we really must rely on our Navy for the protection of commerce, to which mercantile auxiliaries armed and commissioned as such will be most valuable. I do not feel convinced that it would be desirable that a mail steamer with her passengers on board should attempt to fight an enemy.¹

Captain W. F. S. MANN, R.N.: The points on which I intended making a few remarks have been so fully dealt with by the two previous speakers, that I will only enforce what has been said about the utilizing of British merchant seamen in the working of guns if mounted in their own vessels. I have had the advantage of seeing a good deal of these men lately, for during the time I commanded the Victorian Naval Forces we recruited from British merchant vessels sailing to those waters, and at first I was surprised to find how soon they settled down to man-of-war ways. But the difficulty we found was in making good Nos. 1, or captains of guns, and I think that would be the trouble in the mercantile marine. Any man with common sense can soon learn to "work" a gun, but aptitude and sound training are necessary for accurate laying and firing. Admiral Long seems to think that Lieutenant Crutchley intends armed merchant vessels to resist men-of-war. I understood him to mean such armaments were only for defence against attack by vessels of their own class—that they would never offer resistance against a properly built man-of-war. Their heels would be their only defence in that case. Is that so?

Lieutenant CRUTCHLEY: Certainly.

Admiral LONG: I did not understand that.

H.S.H. Captain Prince LOUIS OF BATTENBERG: Practically, I take it, the lecture may be summed up as a plea for the armament of merchant ships in time of war. This is not a new idea. I think it has been discussed here before, and I daresay most of us present have thought about it a good deal. The lecturer has given us three reasons why merchant ships should not be armed. I confess I have never got beyond the first one, which he states to be "the questionable right to fire a shot in self-defence only, or to be in possession of arms." Before going into that I cannot help saying how struck I am with the statement that ships after the Declaration of Paris were supplied with guns and ammunition by the Admiralty on complying with certain requirements. I may be especially ignorant, but I never heard of it before; and if the lecturer can spare me a few words in reply it would

¹ Lieutenant Crutchley having pointed out that he only contemplated defending merchant steamers against mercantile auxiliary cruisers in war, my argument, though weaker, appears to me still of sufficient weight to influence the decision.—S. L.

be most interesting to hear something about it, because it appears to me as being the most important statement that this paper contains. Virtually if it was admitted, as he says, that settles it. It is all the more remarkable as coming so soon after the Declaration of Paris was signed; but, leaving out the question of right for the moment, it may be well, perhaps, to consider how the possible enemy would treat a merchant ship armed. I believe it is one of the recognised axioms of war that the active operations of war should be carried out by the armed forces of the country only. For one thing it is, no doubt, the quickest and most humane way of carrying on war, and a departure from it has always been treated up till now very rigidly indeed. In the Franco-German War there were repeated instances of unfortunate Frenchmen, peaceful citizens, who found their homes and hearths invaded and took up arms against the invader, and, according to the rules, so to speak, they were strung up when they were caught. I do not for one moment pretend that the crew of an armed merchant ship captured would be treated like that, but the possibility ought to be kept in view. And if we do not go to these extremes, the moment a merchant ship begins to fight, the commander of the enemy's ship (man-of-war, or whatever she may be) is perfectly right to treat her as one of the fighting units of the country against which his country is at war; that is to say, that instead of trying to make a capture, to compel her to surrender, bringing the ship into port and making a prize of her, he would attempt to sink her like you would sink a man-of-war. Therefore, apart from the danger of being killed and wounded by gun fire during action, she becomes a legitimate target for a Whitehead torpedo, which is a tolerably appalling thing to contemplate in the case of a merchant ship. In case of capture all on board would be taken off and treated as prisoners of war—unless, indeed, they were dealt with summarily. I do not see how you can possibly get over this point. But then, as Admiral Long has pointed out, there is also the question of expediency. Now as to the question of torpedoing merchant ships: the more I think of it the more difficulty I have in believing that any civilized Power in the nineteenth century would deliberately sanction its armed force committing wholesale murder on the high seas, because that is what it comes to, and nothing short of that. Coal would probably be contraband of war—I have not much doubt about that in my own mind—only coal will be so much more precious to our enemies than it is to us, as we have always got it and they have not, that they will do everything in their power to capture a collier intact; but still if every means of capture failed, no doubt a collier would be liable to be sunk by a torpedo, and justifiably so. Of course there is another side to it which appears very heartless and very monstrous, and I would rather not give utterance to it in this theatre. With regard to the Suez Canal the two distinguished Admirals who have preceded me have already controverted the lecturer's impression, that naval opinion was in favour of keeping the Suez Canal open. To my mind it seems absolutely impossible. When I was senior officer at Port Said a year or two ago a P. and O. steamer ran ashore, and although the Canal was only blocked for about something less than 24 hours, it gave one an idea of what would happen in war-time, for by next morning there had arisen in the harbour at Port Said a perfect forest of funnels; there was hardly standing room, so to speak, inside. What would happen in the case of war? I take it the Canal would be sure to be effectually blocked at the outset, probably before war was actually declared.¹ I maintain, therefore, it would be nothing short of criminal to allow a single British merchant ship to pass Gibraltar or Aden, if war were imminent. The result would be the piling-up of this continuous stream at the bottom of a *cul de sac* 2,000 miles long, which would be appalling to contemplate. I am most entirely in accord with the lecturer on the point of signalling. I, for one, have always thought that on the whole the Morse system is the best. One objection which it appears to me could be raised from the point of view of the merchant steamer is that although the Morse system is no doubt easy to learn if you make up your mind to do it (all our signalmen in the Service know it well, and they continually

¹ I purposely abstained from stating precisely how this could and would be done.—L. B.

use it), yet you must keep it up by constant practice, otherwise you lose it; the lecturer can tell you better than I can how far it would be possible in his Service to keep men really efficient to practise signalling. I would rather not touch upon the other objections raised to carrying guns because of extra weight and want of training on the part of the men, though I must confess I have very considerable doubt as to the practice which would be made by the crew of a merchant ship. The lecturer says that the shipowner declares that he pays his taxes, and, therefore, ought to be protected, and a distinguished Admiral endorsed this very cordially. It may be presumptuous on my part to differ from him, but I confess I should say exactly the same thing. The shipowner is quite right; he pays his taxes, and he ought to be protected. He can be protected, and in my view the only efficient protection of the merchant service is by the Government and by its proper armed forces. That we are short of cruisers is an undoubted and lamentable fact, only I do not see that you want a "Blenheim" or a "Blake" for the purpose; you can get something much lighter, but she must be faster. The real safety for merchant shipping generally appears to me to lie in their speed; at any rate, as regards our larger ocean-going steamers, it is an indisputable fact that there is no cruiser afloat, British or foreign, which can even keep up with them, much less hope to overtake them. As to patrolling trade routes in the way Admiral Nicholson has sketched it out, I confess the idea is new to me that it should be done in that way. It is evident that it would be perfectly useless, and for this reason, I presume, it is proposed that the auxiliary steamers on the Admiralty list are to be armed on the spot, that is, at the foreign stations. In that case, however, the time lost would be something serious. Our distinguished Chairman has had personal experience of this, and, therefore, we shall probably have some interesting remarks on the subject much better worth listening to than anything I can say, but it is difficult to understand how the thing will work.

Captain KING HALL: I feel rather diffident in rising to make a few remarks. I am afraid I entirely disagree with the last three speakers as to closing the Suez Canal in time of war, and I agree with Lieutenant Crutchley that the Suez Canal route will have to be kept open. First of all, people talk about blocking the Canal. If the Canal is to be blocked, you will incur the enmity of all neutral nations, and in order to keep the Canal blocked you must maintain a force on the spot, and if you keep a force there to keep it blocked, you might as well keep a force to keep it open. The trade will have to go through the Suez Canal: I am quite convinced upon that point, and I have thought over it many times when stationed at Suez. No doubt the risks are great in our trade going through the Mediterranean, but there is only one way out of it, and that is to keep the Mediterranean clear of the enemy. If war were to break out with any maritime nation, an event, unfortunately, not improbable, the result would be that all our sailing fleet would be laid up, and also a large number of our slow steamers, and the food of this country, and the raw material, would have to be brought in fast steamers—those steamers which a great many naval men are looking to for help in the duty of patrolling the seas. I believe that for the protection of our commerce we should have to rely upon our Navy principally, and, in fact, almost alone. The Navy must be strengthened. I do not believe in arming merchant ships to protect themselves: I do not think they can do it. There are many objections to such a plan, which have been ably stated by Prince Louis, by Admiral Nicholson, and others, and I should not have risen to say anything at all, had I not felt very strongly on the question of the Suez Canal route. I believe in time of war we shall have to keep it open at any cost. It is not likely that the Americans, Germans, and other neutrals, when they see a chance of taking our trade, will allow us or our enemy to stop the Suez Canal; and I am quite sure it will have to be kept open. If a steamer sinks in the Canal it is very easy to dredge round it, and there is no difficulty in clearing a passage, even without raising the steamer (which would only sink a couple of feet) in the course of a few days. I quite agree with Lieutenant Crutchley that it is highly desirable that the means of signalling should be improved between the two Services; at present, I think it is in a very unsatisfactory state.

Prince LOUIS OF BATTENBERG: I think Captain King Hall has misunderstood

me. I did not mean that *we* should stop the Suez Canal. I meant that the enemy would do it, and that we could not prevent it; not all the King's horses and all the King's men—nor all the King's ships—could prevent it: I am quite sure of that.

Captain KING HALL: We shall have to keep it open.

Prince LOUIS OF BATTENBERG: We cannot do it.

Admiral NICHOLSON: With regard to keeping the Canal open, Captain King Hall seems to think it is possible for us to do it, but I imagine it is quite impossible. Any nation could block the Canal without trouble. Captain King Hall talks lightly about its being cleared with a small dredger in, perhaps, ten days, but Prince Louis of Battenberg has explained what happens even after 24 hours detention. When you consider the advantage that would accrue to the enemy by blocking up our passage to the East, you may be quite sure that some plan for blocking would be carried out. If it were a question, for instance, of two armies racing for India, one going overland and the other wishing to go by sea, I imagine that there would be neither any difficulty nor any hesitation as to blocking the Canal.

Lieut.-Colonel G. T. CARRÉ: I would, sir, with your permission, ask Lieutenant Crutchley if he has taken into consideration the likelihood of a convoy of, say, six armed trading steamers of the P. and O. or Orient class coming into contact with an enemy's cruiser? Would they, in his opinion, give way, or attempt to drive the cruiser from their course?

Admiral LONG: I might mention one fact illustrating the advantage of signalling in the event of war. It occurred in 1870, when Admiral Hornby was ordered home from the Pacific out of the ordinary routine. When we got on the Line he spread out the squadron of six ships to intercept the mail steamer to Rio. They did intercept it, and brought us the two most extraordinary pieces of news I ever heard; one was the loss of the "Captain," and the other was the battle of Sedan.

Lieutenant CRUTCHLEY: There are very few points that it is necessary for me to deal with in reply. I should wish to say that this is no question whatever of a merchant vessel contending with a man-of-war. In the first place, you would trust to your heels, and if you did not trust to your heels your common intelligence would tell you it was no use fighting a ship built for fighting if she had the heels to come to the side of you. The argument in favour of arming merchant vessels is solely to protect them against vessels of their own class, because it is always assumed we have men-of-war enough of our own to look after the enemy's men-of-war. It is the armed merchant vessels that would be sent out by them that would do the mischief. Prince Louis of Battenberg wishes to know if I can give an instance of a vessel armed by the Government since 1863. I think there is a friend of mine present (Captain Ladds, Elder Brother, Trinity House) who will bear me out in saying that about the year 1863 the "Golden Fleece" of the General Screw Company, trading to Calcutta, was supplied with guns and entirely armed by the Government.

Prince LOUIS OF BATTENBERG: Was she intended to fight then and there, or was she armed with a view of receiving a commission subsequently?

Lieutenant CRUTCHLEY: She carried the guns habitually to use if attacked whilst engaged in her ordinary occupation. How could it possibly be contended that a vessel resisting capture (as has been done scores and hundreds of times in the past) is a privateer? Merchant vessels have fought in the wars toward the close of the last century, and did good work too, and if Naval Reserve uniform will not protect its wearers from hanging, the sooner it is so understood the better. It might also be asked whether Volunteer uniform will protect its wearers from the fate of the "franc-tireurs."

Prince LOUIS OF BATTENBERG: Was she entitled to fight at once, or was she to wait? Did she have a letter of marque in case of war?

Lieutenant CRUTCHLEY: Can Captain Ladds give me any information?

Captain LADDS: I am afraid I cannot. I think the guns were only put on board the ship as a precautionary measure, as they would be on any other ships.

Lieutenant CRUTCHLEY: Admiral Long said doubtless there were schemes in existence for the organization of these merchant vessels in the event of war

breaking out. I did not doubt it, but it was not my contention that the Suez Canal would be kept open in war-time, because my own opinion points entirely to the contrary; but I think if you take the sense of all the discussions that have gone on on naval tactics in this theatre you will find the majority of naval officers assume that the Canal will be kept open in war-time. It is for that reason I have assumed that the naval opinion is that the Canal will be kept open. Personally, I think the Cape route will have to be adopted. And although there may be plans in existence for the safeguarding of merchant vessels on the outbreak of war, if none of us know anything about it there will be such confusion that any scheme will be almost unworkable for the first months of naval warfare. I think, without divulging the scheme, some details of it should be entrusted to certain vessels, say mail steamers, telling them that they would have certain duties to perform on the outbreak of war, so that we should not be altogether in the dark. With regard to the question Colonel Carré asked about the six merchant ships and one man-of-war, I should say if the six merchant ships had the heels to run they most piously would.

The CHAIRMAN: I think it only remains for me now to make a few remarks upon what has struck me in the course of this debate, and also before I came here. The question of protected routes and convoys has been already a good deal discussed. The convoys, I look upon it, will be an absolute necessity after war has broken out; the protected route I look upon equally as a necessity when war first breaks out. Allow me to give you a little experience of my own, showing the views I held at the time, and which I still hold; it will explain what I mean. I do not mean vessels rushing up and down at the rate of 300 miles a day, as Lieutenant Crutchley proposes; I mean vessels husbanding their coal resources as well as the enemy does. I happened to be in command at the Cape during the Russian war scare of 1885, and my telegraphic communications were interrupted by accident. I sent all my ships to certain stations, such ships as I had, and I wrote to the Admiralty to state what I had done, and request them to inform shipowners in order that their ships might follow the route from one protected point to another. I believe that is a system that will be necessary on future occasions to be undertaken by all Commanders-in-Chief. In the first place, at any rate, a merchant ship that is chased will know not only where to run to the nearest English cruiser for protection and assistance, but try and lead the enemy's cruiser into the hands of his own cruiser. The great risk to our commerce will be on the first outbreak of war, when, as Lieutenant Crutchley says, the commerce will be scattered about over all routes at once without any knowledge of what is going on, because ships now run long distances without touching anywhere. I think the Orient line go out to Australia without touching at the Cape. (Here Lieutenant Crutchley remarked that the Orient ships now go through the Canal.) In my time they went round the Cape, sometimes they touched and sometimes they did not. The transfer of the carrying trade is of course a thing we have to look upon as possible if we are not prepared to protect our trade. It can only be protected by very careful organization, and also by adding to our cruisers a number of auxiliary cruisers in the shape of armed merchant vessels. But I do not mean by those armed merchant vessels the armed merchant vessels Lieutenant Crutchley is speaking of; I mean the regularly commissioned ship, armed, officered, and acting in concert and under the orders of the Admiralty. In the case of arming other merchant ships I would like to know where Lieutenant Crutchley wants to stop. Does he propose to use his weapons without any commission to do so? If so, when he is caught he is a pirate, and hung as such. It is, no doubt, laid down absolutely in all our authorities on international law, that any ship has a right to defend itself, only you must take into consideration that if you do so it is at your own risk, and that any ship offering what may be called a useless resistance deserves to suffer for it. It probably causes loss of life to the enemy and the enemy would very naturally be irate and would sink you for your pains and not pick any of you up. It used to be said, and I suppose the same law would hold good between men-of-war of the present day, that if a small man-of-war fired into a big one, the big man-of-war would simply sink her and not try to pick anybody up, and it would serve them right. I think that was generally so. I quite agree

with those speakers who look upon it as absolute certainty that the Suez Canal will be blocked in the case of our going to war with any maritime nation, or combination of nations, that can contest with us the superiority at sea. In the case of war with France, for example, the Suez Canal will begin at Gibraltar and end at Aden, and between these two points there will be no mercantile traffic till we have succeeded in establishing our superiority, and then we can go where we like and do what we please, and nobody can bother us in any way whatever. There are one or two points also in connection with the armed merchant steamer. Lieutenant Crutchley depends upon the discipline, but he says nothing about the inducements for the crews of the merchant steamers to fight. I do not think that the crews of merchant steamers will undertake to fight unless it is made worth their while. It must be made worth their while either by very much increased pay, or by hopes of prize money, and if you are to employ the armed merchant vessel with a view of making prize money you turn her into a privateer. I know there are many people who consider the Declaration of Paris very detrimental to this country, but there was also a very prevailing opinion in the last long war, including that of Lord Nelson himself, that "privateers were little better than pirates," and that "he wished there were no such vessels allowed." As for the co-operation of naval officers with the merchant service, I quite agree with Lieutenant Crutchley; but I think I may put it the other way—we look to them for co-operation with us, and we feel certain we shall get it. We can all remember the occasion of the "Trent," when the merchant seamen came forward so splendidly, all eager to share with the Navy the risks and dangers of war and take their part in it, and I am quite sure from my own experience that they will come forward willingly enough now. It so happened that while I was in command at the Cape I was ordered to call out the Royal Naval Reserve—the only time it has been called out—on a certain day, if I got no orders to the contrary. The telegraphic communication was interrupted and I called it out. The men came down from Kimberley and all parts of the Cape with flags flying and cheering; they were all eager for a row. I think it is no use for Lieutenant Crutchley to try to lead us to believe that any independent fighting on the part of a merchant ship is possible or desirable. That we shall require the best of his merchant ships and himself and the best of his men to assist us in case of war there cannot be a doubt, but beyond that, I think he must not expect we shall go.

Lieutenant CRUTCHLEY: If you will permit me to interrupt you for one moment, sir, it occurs to me that the argument is extremely one-sided; these people undoubtedly will be attacking us with the very means which you say we are not to use in self-defence.

The CHAIRMAN: Most other nations, as well as ourselves, are bound by the Declaration of Paris in the matter of privateers, that is, Russia, Prussia, France; I think all European nations but Spain have bound themselves not to employ privateers, but they have not bound themselves over not to arm merchant vessels as we have done. The Prussians during the war with France started what they called a "Volunteer Navy," by way of evading the Declaration of Paris. Russia followed suit and has now a Volunteer Navy composed of merchant ships that are said to carry their guns in their holds, and do partly Government work and partly cargo carrying. They are always working backwards and forwards between the Black Sea and Vladivostock. They have at any rate these ships to lay their hands upon when they want them, and we have also, and have a very much larger pick. I admit that they will employ the same means as we shall employ, but I do not admit that they are at all likely to do it better than we do. If there is a chance of that it is merely a question of organization, and I hope our organization will be found sufficient when the time comes. It only remains for me now to call upon you to give a vote of thanks to Lieutenant Crutchley for his interesting lecture which has evoked a discussion which cannot but be useful.

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Friday, February 10, 1893.

MAJOR-GENERAL LORD METHUEN, C.B., C.M.G., Commanding
Home District, in the Chair.

OUR SWORDSMANSHIP.

By Captain A. HUTTON, late King's Dragoon Guards.

IN the very valuable lecture delivered at Simla, last June, by Colonel King-Harman, on "Officers and their Weapons," with the gist of which, I think, we must all be conversant, he complains of the ignorance of our officers as regards the practical use of the weapons they carry, both their swords and their revolvers. I, for my part, regard the sword as the main weapon, in the wielding of which its bearer should strive to attain as nearly as possible to perfection as his natural capacity will allow; while I think that his revolver should be kept in reserve as an auxiliary arm, only to be resorted to when hard pressed, and in such case he ought to be able to use it with his left hand. I know that some people do not agree with me, but I think you will find that those who hold the contrary opinions hold them because they are utterly ignorant of swordsmanship, and conceive that the easiest way to avoid the discredit is to decry the art of fence as much as possible. Fortunately there are here and there scattered among our regiments a few who study the subject, and have been taught by really good masters, and it is very gratifying to see so many of them here to-day; but, if you were to search the Regiments, Regulars, Militia, and Volunteers right through the Service, I am afraid you would hardly find an average of one such officer per battalion. Colonel King-Harman, with whom I heartily agree, does not blame our young officers so very much, for the reason that, even in the case of those who take a practical interest in the matter, they are obstructed by several serious hindrances.

The want of enthusiasm for swordsmanship is largely due, I think, in the first place, to the apathy of the governing bodies and head-masters of our great schools. Now all, or practically all, of these great schools have now-a-days what are termed Army Classes, which are devoted to preparing boys for the army competitive examinations—to training them, in fact, for a military career. One would be inclined to imagine, if it were not too well known to be otherwise, that these head masters and governing bodies would see the advisability of giving the lads some sort of sound instruction in the use of

the arms they are destined to carry. Some schools, I know, have Volunteer Corps, in which boys are drilled, and taught to use a rifle, the weapon of the private soldier, but the sword, their own future arm *par excellence*, is left out in the cold altogether; in certain cases, it is true, some fencing master of repute is allowed to teach, but attendance at his classes is entirely voluntary, and, as a rule, he only comes down to the school once or twice a week for an hour or two at a time. Now, at most of these schools the boys are compelled to take part in certain games whether they like them or not, usually cricket and football. To cricket and football I am not heretic enough to take exception—they are good, healthy, open-air games, and for schoolboys generally very desirable; but I really think that in the case of the army classes, out of six days of compulsory football some three hours might be devoted to teaching the, to them, much more necessary art of fencing; in fact, every boy in the army class ought to be compelled to learn this just as much as he is compelled to take part in the other games, and the instruction ought to be given by a master of the highest proficiency obtainable, whether at home or from abroad. The *foil* should be the weapon selected for the commencement, for when foil practice and sabre play are properly taught, the former leads naturally into the latter. As compulsory work, three good hours a week should be sufficient, but the boys should be encouraged to attend voluntarily as much as possible, and the more intelligent of them should be inducted into the art of teaching also. Some schoolmasters, I know, will hold up their hands in horror at the bare idea of such an innovation as this; but I must remind those gentlemen that army classes themselves are an innovation, and that the ultimate needs of their members ought to be attended to. From my own experience I know that, provided the instruction be sound and the teacher intelligent, a boy of fifteen will learn to fence in about one-third of the time that is required to teach a grown-up man, although the man may be only in his twenties; and if the boys in these classes were but so taught, they would join their regiments not only expert swordsmen, but with such a passionate fondness for the art that they would bid fair to inoculate their less enthusiastic brother officers with the same virtue.

Let us now, for the sake of argument, suppose that the schoolmasters are willing to recognise fencing as necessary for their pupils; they will naturally ask, where are we to obtain satisfactory teachers? My answer to the great rich schools is, if you want, as you ought to want, a really proficient resident master, you will have, until the country possesses a national school of arms at which such men may be trained, to import him from France, the headquarters of the art. You will not, of course, get one of the highest rank to leave his country, any more than the French racing men can get the leading English jockeys to settle permanently over there, but you will easily get very excellent teachers of at least the second rank, provided their salaries are forthcoming; while in large provincial towns, such, for instance, as Eastbourne, in which place, as a resident friend of mine told me not long ago, "keeping school is the leading industry," there ought

to be occupation for more masters than one, and yet, owing to the attitude maintained towards swordsmanship at present by the school-masters, if a really proficient man were to take up his abode there, I do not believe he would be able to earn his living. Here in London there are a few fencing rooms, some of them kept by Englishmen; but it is a fact, that if we want fresh men who can teach the art as it ought to be taught, we have to go to France to look for them. At the London Fencing Club, French professors are always employed; this should not be the case, for, as the "Saturday Review" pointed out more than a year ago, there ought to be about the country enough sound teachers not only to supply our provincial towns, but our villages also, if necessary.

The only establishment in the country which professes to train fencing instructors is the military one at Aldershot, and it appears to me that both its traditions and its methods have never been such as to command success. It was inaugurated some thirty years ago, and, being then an absolutely new creation, how very easy it would have been to have founded a school which would have rivalled the famous French military school at Joinville le Pont; and there ought to be no reason whatever why we should not possess instructors equal to M. Sanze and his comrades, who were brought over to the Royal Military Tournament in 1891, not to enter the lists against our military masters, but merely to perform before the public.

At the time I have alluded to, early in the sixties, it is not easy to conceive why our authorities abstained from calling in the assistance of one or other of the great London masters, for there were then among us several men of very high professional repute, any one of whom might have been employed to train a nucleus of instructors; there was Henry Angelo, the last of his house, with his chief assistant and afterward successor, the famous McTurk, the greatest swordsman and most accomplished master of fence that our nation has ever produced; there was Captain Chiosso, a teacher equal, if not superior, to Mr. Angelo, and there was Mr. Shury; while among resident foreigners there were MM. Gillemand, Pons, and Prevost, all of the first rank. Professors such as these as head-masters, under the supervision of officers possessing sufficient skill in the art to be able to see whether or no the master and his assistants were doing their work thoroughly, would have created for us a training school of the highest order. But none of these eminent men were selected; on the contrary, the authorities confided their work to a Mr. Archibald McLaren, who then kept a gymnasium at Oxford. This gentleman was undoubtedly an adept at teaching elementary gymnastics, but unfortunately for us he was not a swordsman, although he believed himself to be not only that, but a master also; to his establishment then an officer, not, I think, selected on account of his prowess as a fencer, and a party of non-commissioned officers were sent for instruction, and there they remained for a matter of six months, a period pretended to be sufficient not only to make them fencing masters, but gymnasts as well; and it is this wretched six months that has done so much harm ever since. All swordsmen, who fence with their

brains as well as with their bodies, know well that it will take a year of good solid work, taking a lesson three times a week, to make a man a passable amateur, and that with the foil only; while I am told that in France it takes two years, working every day, and all day, to train a mere *prevôt*, the lowest rank of instructor, who is not allowed to teach except under the supervision of the master himself; and in Italy, as Signor Parise informed me last year, it takes three years to form a master; and yet at our military training school the man receives his certificate after six months' tuition, during which time he has to undergo a gymnastic course, and possibly one of boxing also, which naturally reduces his fencing to something like three months; and it must be remembered that he has not the advantage of studying either under a Sauze or a Parise. A six months' course is utterly inadequate, even were the system of instruction one of the highest order, which it is not; and when we compare this official system, which our army instructors are compelled to use, with the time-honoured method of the French masters, the faults of the former become so glaring that it is a matter of astonishment that such a book should have been forced upon us for more than a quarter of a century.

With the first part of this work, which deals with the elementary positions, there is but little fault to find; this, however, is not due to its author, but to the strenuous opposition to his teaching of the late Mr. George Chapman, one of the finest and most learned amateur swordsmen that ever existed; but, unfortunately for us, Mr. Chapman directed his attention to the first part only, and it is the rest of this book which, so far as time permits, I must compare with the true French school.

McLaren gives us, much as other writers do, the four lines of attack as seen when the foil is held in the central or medium guard; and he also explains the engagements of *quarte* and *tierce*, in which, of course, one out of the four lines is covered, but he makes the mistake of basing all his subsequent lessons on this central guard, in which every one of the four lines is left open.

We now come to what are termed "direct attacks," which are attacks made upon any opening shown by the opponent, without having recourse to a feint or other movement for the purpose of creating one; they comprise the "*straight thrust*," the "*disengagement*," a thrust delivered on the line immediately opposite to that on which the engagement is formed, the "*dérobement*" made on the uncovered line, high or low, on the side of the engagement, and the "*coupé*," or *cut over the point* which can only be employed on the upper lines. With these the official book confuses series after series of attacks in two and three movements, which cannot be "direct," as they have in their composition one or more feints or deceptions of the blade. Common sense would suggest making the pupil acquainted with these, the simplest forms of attack, before showing him the way of defending himself from them. McLaren thought otherwise, and he put the cart before the horse by teaching the parries before making it clear to the beginner exactly what they are meant to counteract.

Now for the parries. There are two ways of effecting a parry: first, the incomplete form of the "*parade d'opposition*," in which the foil is merely passed into the required position in such a manner as to cause the advancing point to glide off it, a more or less sluggish movement, and, second, the complete one of the "*parade du tac*," which finishes with a bright, crisp, little rap on the adverse blade, the springiness of which helps greatly towards the prompt delivery of the *riposte*; the latter (*parade du tac*) is the parry used by the French masters, while the former, the incomplete one, is enjoined by our official book.

I now come to a very important matter in connection with the parries: the two positions of the hand, *supination*, when it is held with the palm more or less upwards, and *pronation*, when the palm is more or less turned down. We can easily perceive which of these is preferable by taking a foil in our hand, and holding it in the position of *sixte*, which is the extreme point of supination; we now place a couple of fingers of our left hand on the lower part of the biceps, muscle, and we find that muscle doing its office in supporting the forearm and sword in their proper position. We now turn our hand gradually round to *seconde*, the extreme point of pronation, and we find that the biceps, practically speaking, goes off duty, the result being that the hand, when in pronation, is very liable to be drawn downwards by a low feint, and, being so drawn down, it misses the power necessary to pull it up again.

The French recognise eight simple parries, four of them in supination and four in pronation; in supination we have *quarte*, with the palm of the hand half turned up, for the inner high line, and *septime* formed from it by simply dropping the point for the inner low line, *sixte* with the hand in full supination for the high outside, while from *sixte* is formed the *octave* for the low outside by again merely dropping the point; these are the parries usually taught by the best French masters. Certain Englishmen have, I know, objected to *sixte* and *octave* because they allege them to be weak positions; if, however, they are correctly formed they are strong enough, and that which is stronger than strong enough very soon degenerates into the coarse and clumsy.

The four parries in pronation are *prime* for the high inside, *quinte*, formed something like *quarte*, only with the palm turned half down, for the low inside, *tierce* for the high outside, and *seconde*, a very heavy parry, for the low outside. These movements are sometimes given to advanced pupils, but only as surprise parries, and not as a means of training the hand. The official book dismisses the supinations somewhat airily as belonging to "the early stages of the art;" a complete mistake, for, as history shows us, the rapier, the demi-rapier, and the early small sword were used chiefly in pronation, and in some cases the swords were actually biased to that effect. It gives us, first, what it erroneously calls *quarte*, with "the back of the hand turned slightly upwards," which is not a *quarte* at all, but a *quinte*, the most faulty parry of the whole eight, as it forces the point off the line, thereby interfering with the *riposte*. It gives us *tierce*

formed in the usual way, and also the *seconde*; this latter is properly formed from *tierce*, as is *octave* from *sixte*, by simply dropping the point; but the Regulation book goes out of its way to make the movement an awkward one, forming it by a "semi-circular sweep downwards and outwards over the inner line," which is not menaced at all, before arriving at the line which has to be defended, while it totally ignores the *septime*, which is, perhaps, the most brilliant and the most baffling of all the parries, and without which many very important combinations of defence are impossible, but puts in its place a monstrosity called "semi-circle," which the author facetiously describes as "the most artistically formed" of the series; this calls for especial notice.

Observe that the point to be defended is the low inner line, to do which, from the *quarte* engagement, we have only to drop our point; but the Regulations ordain it to be otherwise, namely, by "a free sweep of the blade over the outer line traversing the under division of both lines," which brings us, after having traversed three-quarters of a circle, into that very position of *septime* which we had reached by much simpler means. Well; awkward as their movement is, one would suppose that, having at last arrived at the line threatened, they would be satisfied; but no! they go still further, "ascending on the upper portion of the inner line until the point rests at the elevation of the shoulder, and a few inches above the hand, slanting obliquely to the left front"—that is to say, with the point designedly off the line—not a good position to *riposte* from. Compare the text with the illustration and you will see that if we carry out the order faithfully we finish by guiding the enemy's point straight into our own face. This is bad enough, but the counter of this parry, termed "counter-circle," is even worse. I think, however, it is scarcely worth while to spend time in discussing it in detail, and I have, moreover, decided to point out only the primary blunders of this system; to deal with it completely would take too long a time.

There is another thing much to be deplored in our military teaching, and that is the "class lessons." The French military school is most positive in enjoining that the instruction shall be *always individual*; ten minutes of personal teaching is worth more than an hour's work in squad or class, in which it is impossible, especially in the case of lessons in two ranks, to train the pupils, rough beginners as they are, to execute the movements with that closeness and delicacy which is the life and soul of point fencing; and, moreover, it is practically impossible for the instructor to notice and check all of even the most palpable mistakes. As a case in point, not so very long ago I was looking at a performance of this sort, when a thing struck me—which had evidently not struck the teacher—and it was that half the men in the squad were holding their foils upside down; and I wish you could have seen that sergeant's face when I pointed it out to him. These class lessons with the foil are more to be condemned even than those which the officers have to perform in the infantry sword exercise, about which Colonel King-Harman spoke so emphati-

cally; their only possible object can be to save trouble to a lazy instructor at the expense of the efficiency of his pupils.

With such a system as this, and with instructors so inadequately trained, can we be surprised that our young officers take scant interest in the subject? Besides, in the infantry they have but slight opportunity for learning the little they might learn; for, although cavalry regiments are allowed a fencing room of some sort in their own barracks, this luxury is still, I believe, withheld from the infantry, although from the nature of their work they have much more time to spend in it.

Before leaving the foil, I should like to draw attention to something very important to the student; it is the need of cultivating two great faculties: one being "*doigté*," or the art of guiding the foil with the fingers rather than with the wrist; while the second is "*sentiment du fer*," which governs and decides the movements of the weapon, especially in defence, by the sense of touch. Nearly all the great masters of this century tell us in their works something about the advantage of possessing these faculties, but they one and all omit one thing, and that is to tell us how to acquire them; in fact, the masters undoubtedly regard them as trade secrets, and, therefore, by no means to be imparted to their amateur pupils; they are scarcely to be regarded as natural gifts, but they can easily be acquired. I will explain the "*doigté*" first.

A few months ago I happened to be laid up from an accident, and, being unable to fence, I took to thinking instead. It seemed to me that there must be some way of training the fingers to control the foil; so I got hold of a light little George III small sword and began manipulating it in this way: I placed it correctly in my hand, and then lifted up the thumb from off the grip, and commenced guiding the movements of the point with absolutely nothing more than the forefinger, and this, although I was lying on the sofa, I found to answer my expectations so well that I got up on to my crutches in order to complete the study. I made, or imagined, a little spot about the size of a shilling on the wall, about as high as my shoulder; I extended my arm and sword completely towards it, and then executed, using the spot as a mark, such simple movements as disengage, one, two, double, &c., and I found that by guiding with the forefinger only the movements became extraordinarily close and accurate, and I experimented similarly with the simple and counter parries, and with combinations of them, finishing each movement with a *riposte*. Now these are exercises which we can perform by ourselves without the assistance of a master, but it must be distinctly understood that they are nothing more than gymnastic practices for the finger; I feel sure, however, that, if they are used with regularity, the finger will become so habituated to doing the work that it will continue to do it when the foil is held in the usual manner in a lesson or an assault. I will not trouble you here with all the detail of these studies, because I have already made them public in the United Service Magazine of this month.

The second of these faculties is the "*sentiment du fer*," and it also

is to be gained by study; but here the assistance of another person is required, although a professional master is not absolutely necessary, seeing that two amateurs who understand the movements can practise them together, and so very materially improve each other's play. The exercises are performed at half distance, and the attacks are delivered with the simple extension of the arm, and without the lunge, as the object in view is the training of the hand only. They are, moreover, as beneficial to the one who acts the part of master as to the pupil, for, in order to give the lesson properly, the movements of his foil have to be studiously close and accurate; and here he will find the benefit of having previously mastered the "*doigté*" studies. These lessons are no invention of my own, but were given to me many years ago, for a special purpose, by that famous master the late Mr. McTurk. They are well known to many foreign fencing masters, but, beyond myself, I do not know more than two or three living amateurs to whom they have been imparted; the masters hold them back from the mass of their pupils just as they hold back the "*doigté*." I have arranged them in "The Swordsman" in five parts, under the name of "Blindfold Lessons." Their essence is that the pupil learns in executing his parries and *ripostes* to be guided by the sense of touch alone, for during the whole of them he has his eyes shut; the result is that the entire power of sensibility centres itself in the arm and hand to such an extent that the nerves seem almost as if they were continued into the blade itself, and this sensation is emphasized by the master feeling the pupil's blade, not by pressure, but by moving his own foil up and down the centre of it, making the steel bite, so that when this feeling ceases he knows that the master is disengaging, and that it is time to execute whatever parry has been previously ordered.

I must now revert again to the text on which I am preaching—Colonel King-Harman's lecture. He is very severe upon the "mild course of singlestick play" which the officer goes through when he is young, and the "curious course of instruction in what is known as the infantry sword exercise," and it is of this latter especially that I must now speak. First, with regard to the manner in which it makes us hold the sword, with the thumb and fingers clasped round the handle; this was objected to in quite early times by a famous old swordsman, Captain John Godfrey, who lived in the days of the eighteenth century gladiators, was a pupil of the celebrated Fig, and brought out in 1747 a very interesting and instructive work on the small and back sword, and this is what he says: "The common way of holding the sword is with a kind of globular hand, that is, with all the fingers and the thumb making a circle round the sword. The consequence is that, when you come to make your cut, your gripe moves and slips round your palm, and you lose your directing edge. But let the sword be held with your thumb raised upon the surface, and extended in a straight line, you will never fail to carry an edge." This is the way in which both the Italian and the French masters hold their sabres, but the faulty hilt and absurdly short grip which we are compelled to use make it, for us, somewhat difficult. This

regulation way of holding the weapon is conducive only to coarse and heavy play, which is furthered by the performance of what is termed the "assault," in which the cuts are made from the shoulder and elbow, a bad preparation for an exercise which has to be defensive as well as offensive. The great Italian masters, Parise and Cesarano, as well as the French, instead of using a cumbrous "assault" of this kind, train the hands of the beginners with a series of exercises called "*molinelli*" or "*moulinets*," in which the arm is held quite straight, and the revolutions of the sword are made only with the wrist and fingers.

I take great exception also to the "engaging guard;" this is a rather low hanging guard, and about the most awkward position conceivable for the arm to be placed in, owing to what Godfrey describes as "the twisting and straining of the muscles," especially those of the shoulder, whose work it is to hold up the arm. The prize-fighting "gladiators" of that time—for the early prize fights were with sharp swords and not with fists—certainly recognised a guard of this nature, and called it by a rather disagreeable name, "the coward's guard," to wit, a sort of guard for a timid swordsman to crouch under, but a very bad one for a bold man to attack from. I allow that for the defence of the inside it is fairly useful, but experience tells me that it leaves the outside dangerously open both to direct and indirect attacks, especially when the opponent stands on the medium. This latter was recognised by Godfrey, Loneragan, Miller, and, in fact, all the leading writers of those very practical times. It is a middle position between *quarte* and *tierce*, and the thumb, as Godfrey recommends, is extended along the back of the grip. Now it is only by the action of the thumb and fingers in this position that the feints can be made with the necessary crispness; and, further, it is by a sudden and quick pressure of the thumb on the back of the grip that an initial velocity is imparted to the cut sufficient to render unnecessary those heavy slogging movements which I have already condemned.

The greatest fault of all in the infantry sword exercise is that it inculcates the teaching of swordsmanship *only* in squads of single or double rank, and ignores individual instruction altogether, the result being that it degenerates into a mere barrack-yard drill, robbed entirely of the interest which attaches to an intelligent personal lesson. The utter feebleness of a performance of this kind is only too palpable, and it tends to create indifference a great deal more than enthusiasm.

What is really needed as a text-book is a judicious blend of the time-honoured English broadsword play with certain details, and not so very many of them, derived from the modern Italians (and this I claim to have already provided in "*Cold Steel*" and "*The Swordsman*"): first the "*moulinets*," and, second, the high *quarte* and high *tierce* as head parries (though these are really old English, and are recommended by Godfrey), together with a very important auxiliary parry which I have introduced under the name of "high octave." The people who are charged with the training of our military fencing masters appear to be either unwilling or unable to under-

stand this, so I had better point out its uses, which are: first, to stop a *riposte* delivered over the blade after a *quarte* parry, and, second, to parry a cut at the right cheek delivered after giving a beat with the back of the sword on the inside of the opponent's blade. All this was brought to our notice last year at the Royal Military Tournament by Signor Parise himself, who, of course, called the high octave by its Italian name of "*ceduta di sesta*," but those who cannot or will not see what is put to them in plain English are not likely to understand it much better when explained in a foreign tongue.

In conclusion, I must repeat that we have no right to be surprised at any apathy on the part of our young officers, seeing the disadvantages under which they labour. In most cases they have not so much as a room in which to practise fencing if they are so minded, while, where there is a garrison gymnasium within reach, the only instruction they can get is of so poor a quality that it is almost worse than useless. For this I do not blame the sergeant instructors, because it is not their fault; most of those whom I have met with have been good hard working men, extremely keen and anxious to acquire any information that a well-skilled person may be good-natured enough to give them; but they are compelled by order to teach a system they know to be wrong, and which is no better than a sorry burlesque on fencing as it is taught at its headquarters in France. That interest in the subject should be so slight is not their fault, nor is it the fault of the young officer; the fault must be looked for elsewhere.

The CHAIRMAN: We are very grateful to Captain Hutton for the interesting and emphatic lecture he has delivered to us, and not only for the large attendance that there is, but also for the number of names that I have already had submitted to me for the discussion. Before I make any remarks of my own, I will say it is a subject of very deep interest, I might say of vital importance, to the army, and I hope you will speak out openly and frankly what you think.

Major-General F. HAMMERSLEY: Lord Methuen, ladies, and gentlemen, the lecturer has ventured to speak disparagingly of a dear old friend of mine, the late Mr. Archibald McLaren, to whom not only the army, but the country at large, is more indebted than is generally known for the great progress that has been made in physical education during the last twenty-five or thirty years. I will not comment upon the taste he displays in thus decrying a dead man.

Captain HUTTON: That is rather strong.

Major-General HAMMERSLEY: It is strong, for I feel strongly; but I will not allow his memory to be assailed, and as far as my poor powers go I will endeavour to do justice to it. In 1858 or 1859 it was brought to the notice of the military authorities that a system of gymnastic instruction had been found very beneficial in the Prussian and French armies, and a Committee was appointed, consisting of Sir Frederick, then Colonel, Hamilton, of the Grenadier Guards, Dr. Parkes, Professor of Hygiene at Netley, and Mr. Archibald McLaren, all, alas, now with the majority. They were instructed to visit the different schools in Germany and France, and report. Their report was approved, and it was decided to establish a somewhat similar system in our own army. The question then was where the instructors should be trained, and it was decided that a class of non-commissioned officers should be selected, and sent to be trained by Mr. McLaren at his gymnasium in Oxford. I must remind you that at this time there were scarcely any gymnasia in the country; there were none in any of the public schools. There were scarcely any in any provincial towns, and even in London there were only a

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few fencing schools, such as Angelo's, Chiosso's, the London Fencing Club, and some others, where fencing was principally taught, and also a certain amount of gymnastics, but on no regular system, and nothing that could be dignified by the term physical education, as Mr. McLaren called it. This class of non-commissioned officers, not too carefully selected, because Commanding Officers were loath to spare good men for what they did not see was likely to be of much benefit, was sent to Oxford under an officer who the lecturer says in his paper was not selected for any prowess in fencing, but he spared my blushes in reading it by leaving that out. It is quite true that this officer was not a fencer, but at the same time he gave sufficient satisfaction to the military authorities to be entrusted with the direction of the gymnastic instruction of the army for upwards of fifteen years. These instructors were trained by Mr. McLaren, and at the same time he busied himself by compiling a book of instructions in all the different exercises suitable for the army. It is very probable that with the progress that has been made in physical education during the last twenty years some faults might be found with this book, but at the time it was compiled it was certainly very far in advance of anything that had been hitherto published. We are also very much indebted to Mr. McLaren and this first class of non-commissioned officers for this great progress in gymnastics; for from the start thus made instructors have been sent out, not only to the army, but to gymnasia all over the country, literally in hundreds; for now I may also tell you that almost every public school is provided with a good gymnasium under capable instructors, notwithstanding the sneers of the lecturer, and there are hundreds in the different provincial towns.

The CHAIRMAN : Instructors in gymnastics or fencing?

Major-General HAMMERSLEY : Gymnastics. I have now done with gymnastics, and will turn to the immediate subject of the lecture. It is very true that this class of non-commissioned officers who were sent to Oxford did not leave that place with very much knowledge of the art, and they could scarcely be expected to learn fencing and gymnastics in the short space of six months; but Mr. McLaren very wisely thought that it would be well to teach them at all events the rudiments of the art, trusting to further practice and instruction, possibly under English or foreign professors, to improve themselves. That object was kept in view; but the jealousy of the London Fencing Club was such that, though with great difficulty and with the assistance of an influential member of the Club I obtained permission for the principal fencing instructor at the Aldershot Gymnasium to visit the room while fencing was going on, the fencing instructors there, MM. Gillemand and Prevost, were not permitted to give him a lesson or even cross foils with him. We were, therefore, thrown upon our own resources, and left to do the best we could for ourselves, and I am free to confess that bad was the best. But the lecturer is bold enough to say of Mr. McLaren that he was not a swordsman, though he believed himself to be not only that, but a master also. Captain Hutton is strangely in error. Mr. McLaren during his youth spent many years in Paris, where he practised at all the principal *salles d'armes*, and he was not afraid to meet any one, professional or amateur. He told me himself—and I had no right to doubt his word—that he had gained his diploma, as they called it, of *maitre d'armes*, which the lecturer well knows is jealously guarded, and is never given to any candidate, except after a very searching test by a committee of experts, and showing that he is thoroughly capable of instructing. I have now said my say in defence of my old friend, and I hope that before we leave this room Captain Hutton will have the grace to say that he spoke without sufficient knowledge of him. I will now turn to the book. It is true it is a faulty book, and I do not doubt at all that Mr. McLaren would have written a very different sort of book for a different class of learners, but it was intended simply as a handbook to commence instruction in fencing, and it must be remembered the class of men it was intended for and the time at which it was written. I was not a fencer when I went to Oxford, as Captain Hutton justly observes, and I have not practised much since, my taste not lying that way, so I do not feel competent to answer his objections to the faults, as he calls them, and no doubt there are a great many faults, in the book; but, with your permission, in the absence of Colonel Fox, who has been obliged to go abroad I should like to read a paper which he has left, and asked me to read against th

views of the lecturer, and in some sort explaining the book. He says: "Lord Methuen and gentlemen, I agree with Captain Hutton's remarks that the practice of arms should be more generally studied among the officers of our army, both in the cavalry and in the infantry, than it is. Unfortunately only a very small minority of them take any interest in the matter. As to our public schools, I much doubt if their head masters will, as a body, accept Captain Hutton's opinion on this subject. At present the physical training of candidates for the army is sadly neglected, the excuse given being invariably that all their energy is required for the mental strain necessary to prepare them for the examination. Any physiologist can tell us how absurd such an excuse is, the *mens sana* not being capable, if the individual is to be adapted to lasting purposes, of a separation from the *corpus sanum*. But this is somewhat beside the present question. But would it be wise to ask these young men, whose brains are already overworked in the majority of cases, to attempt to learn the art of fencing, an art that is universally acknowledged by leading physiologists to be a severer tax upon the brain than any other form of exercise, and one that, even to an artist like M. Mérignac, of Paris, is at times an almost unbearable mental and nervous strain? Besides which, fencing, if indulged in to any extent by unformed and growing youths, frequently produces lateral curvature of the spine and other deformities. If necessary, I can produce chapter and verse for this statement." Some gentlemen laugh at that statement, but I should like to read a doctor's opinion upon that point, a doctor who has given up a great deal of his time to gymnasia and studied physical education very closely. The doctor says, "The physique of the majority of army candidates is lamentable, and the more so because it is easily preventable. The physical education in our public schools is practically *nil*, the national games being in no way educational, but only recreative, exercises and games of skill, all of which games are necessarily attended by predominant use of only certain parts of the body and sets of muscles. All such games of skill, if practised assiduously (as they are by those who show a natural aptitude for them), involve partial development of the body, with the necessary corollary, asymmetry of the body, which means more or less actual deformity. Fencing is essentially an exercise of skill, as much, too, an exercise of the brain as of the limbs, and the fatigue attendant on fencing is less a muscular fatigue than a nervous one. All games of skill indulged in during the developmental period of the skeleton (which is most active from 16 or 17 to 25 years of age) should go hand in hand with regular, systematized exercises, which only can produce a symmetrical development of the body. And the inexcusable (except through ignorance) neglect of this sends the sorry apologies of manhood into the world that we so often see. Fencing, owing to its peculiar tendency to produce curvature of the spine, lowering of the shoulder, and concomitant flattening of the chest, should on no account be allowed during the malleable and yielding, and still growing, period of the skeleton. For army candidates fencing, as an art, should certainly not be taught until their entrance into Sandhurst, and then only when accompanied by systematic exercises applied to the whole body." Colonel Fox continues, "I am not concerned with the past history of the Aldershot gymnasium, or its original formation. But it seems to me that it would have been almost impossible to have started it on the same lines as that at Joinville, where the non-commissioned officers under training devote three years (of seven hours' work a day) to the study of the art of fencing alone. The number entering every year is one hundred (all having previously had, at least, one year's training under their regimental *maitre d'armes*, and being selected for Joinville, because they have shown exceptional promise). Only sixteen of every hundred ever qualify as *maitre d'armes*, the remainder being sent away as unworthy of further instruction. Whatever faults the lecturer may have found with the old system of teaching at Aldershot, I do not think he should condemn the present until he has honoured us with a visit, and seen the work that is being done, and the system of instruction that is now carried out there. As regards the 'six months' fencing and gymnastic course, and the amount of work that has to be crowded into it, I must draw attention to the fact that there are many other matters to be considered besides the desirability of teaching men to fence. What we want to

produce in this country for our army instructors is a really good 'all-round' man, and not a brilliant fencer only. If Captain Hutton chooses, he can see at Aldershot sixty-five non-commissioned officers who have had thirty days' instruction in fencing (of forty minutes per day), with whose progress he will be able to find but little, if any, fault. I believe that the last reprint of the book which is alluded to was issued in 1886. It has been out of print, and disused, for at least five years. The art of fencing cannot be learnt from a book. Therefore it appears to me hardly practical, or desirable, to issue one, unless the authorities order me to do so. The present system of foil-fencing at Aldershot more closely resembles that carried out at Joinville-le-pont than any other. This being the case, I consider that I may safely ignore Captain Hutton's criticisms on the attacks and parries that he supposes we teach. Our system of sabre-play follows closely the lines of that elaborated by the Cavaliere Massiello of Florence, which I consider more practical than any other, and also much more suited to the needs of our army. I altogether decline to have the system of fencing at Aldershot judged by the standard of an official work which is out of print, that I had no hand in compiling, and whose *dicta* are absolutely unacted upon in the headquarter gymnasium. Class teaching of fencing has been abolished at Aldershot for some time. As a general rule one instructor has charge of every three or four men. In sabre-play an 'upright' engaging guard has been in use for a very long time, instead of the 'hanging-guard' that Captain Hutton now very rightly condemns, although in one of his earlier works (that is now in my possession) he recommends its adoption. I consider that the 'moulinets' he recommends are utterly useless for a sword suitable to our army, since they are done with the wrist only. To be of any practical value (*i.e.*, to teach a swordsman to deliver a disabling cut), they must be done with the hand, wrist, forearm, and elbow, combined in co-ordinate action (the muscles of the shoulder being used as little as possible), as recommended by the Cavaliere Massiello. The grasp of the sword, that we have taught for some years, is that with the thumb extending along the hilt. To conclude, I cannot but think it is a pity that Captain Hutton has not taken the trouble to find out for himself, or to come and see what is actually going on in the headquarter fencing establishment at Aldershot, before condemning it, as he is evidently in entire ignorance of the system that is carried out there."

Colonel GORDON M. IVES: As one of the unfortunate "cripples" condemned by that doctor, I present myself before you after forty years' experience of fencing, for I began fencing at fifteen, and am now fifty-five, and still believe I am not a cripple. I still fence when I can, almost every day of my life. I really think we have gone a little bit astray in the last five or six minutes. Captain Hutton, I am perfectly certain, did not give this lecture with a view of attacking anybody. It is for the future and not for the past, and I would beg of us all to "Let the dead past bury its dead." We are not met here to abuse anybody who has done work, and I am quite certain that that gentleman whom I never heard of before, but who is so ably defended by General Hammersley, did the work to the very best of his ability, and probably very good work up to the date at which he finished. But we all know very well, because there is no human being can deny it, that in the whole English army, out of many thousands of officers who carry swords, there are comparatively very few who have the smallest notion of using the weapon they carry with that absolute confidence that habit alone gives, because there have been no teachers and they have never been taught. That, gentlemen, is what we have met here to try and bring before the public. It is not for us in this room to say exactly how it is best to be remedied. Our chairman, who is one of the finest fencers in the world, has already expressed his concurrence in some of the views that are likely to find favour here by being present to-day. What I think Captain Hutton wishes to point out is that the officers of our army in all its branches are absolutely ignorant of almost all kinds of sword fighting. I happened to be going down to hunt near my home in Hampshire one day, knowing nothing of the school at Aldershot, and meeting two officers in the train also going to the same meet of the hounds, I said, "If Sir Evelyn Wood will allow me to come and practise in the summer time, when I am at home, at the Fencing School, at Aldershot, I shall be very glad." They said no doubt he would. I said, "Do many officers go

there?" The reply was "No, hardly one." They said, "You will find some instructors there, and you will find some very fairly trained men, but you will not find any officers there." That may or may not be correct as I understood it; but I believe it was, and I have no reason to doubt it. The fencing school is known all over the world as being the finest school that exists for training the nerves of men. There is probably nothing that makes a man's nerves so good and sound as perpetually standing opposite to his fellow man and fighting him. I will go so far as to say that if you take the greatest muff that ever lived with the sword, if that muff has been accustomed to stand opposite another man and peg into him for years and years, or even for one year, that muff that was, will be a better man if he stands up to fight a fellow-man who is perhaps naturally more skilful, but who has never had a sword in his hand. The habit of fighting is of enormous value. Formerly our boys learnt it a little by fighting very largely at every school, and, although that is a comparatively small way of fighting, yet still it did an infinity of good. That fighting does not, I am told, any longer exist to the same extent, and fencing is really the school-room of fighting, it is the very beginning of fighting, and must be practised by every man who wants to fight well with any kind of sword. But at the same time that is only to a certain extent. It is the teaching element of the sword only, for if you have to fight a man you must recollect that you have not, when fighting, got a mask on. The mask in fencing makes just the difference—in fencing you do not hit the head: in fighting you hit the head. I came here to-day hoping that this might be the introduction to forming a sort of lead to public opinion, to point out that there are absolutely hardly any officers of the English army who can fight with the sword at all, with skill, and knowing that there are thousands of those officers, of all the Services, now waiting and wishing to be taught, I hope that by coming here to-day and listening to the very able lecture, supported as we are in this room, we may draw public attention to this matter. If we can lead the authorities to lend a not unwilling ear to our feeble cry, we shall, I am sure, have achieved the object of this meeting.

Captain H. H. WIGGAM, Scots Gds.: Captain Hutton has gone over the ground, I think, so thoroughly that he has left very little to be added beyond confirming his remarks. But there are two or three things which might be said to belong to the subject and which I think ought to be pointed out. One is that this apathy, as I am afraid we must call it, on the part of regimental officers, with regard to fencing and swordsmanship, is, a great deal of it, due to what Captain Hutton has pointed out, viz., the difficulty of obtaining instruction. I can only say that I, myself, who have been practising swordsmanship in one form or another for some fifteen years, have found it almost impossible to obtain anything like good instruction from anybody excepting a foreign professor. That practically means that you must live more or less in a large town. If you live in London you can get good teaching; I believe you can in some provincial towns. I can only say my recent experience on that subject is that when three or four of us who are rather keen about swordsmanship tried to get hold of a fencing master in Dublin, which I think we may describe as a fairly large town, we were absolutely unable to find one. Unfortunately the man who ought to be able to help us, the regimental instructor—it is no fault of his, and regimental instructors are always the first to acknowledge it—is not a man who helps at all. He is only too willing to learn and to help one as far as he can in every possible way, but he is no use as a swordsman. There is another thing which I think rather goes against officers taking up swordsmanship in the way that many of us think they ought to do, and that is that there is an impression existing that close quarter fighting is a thing of the past. I think that is due to a very great extent to the fact that there are certain, perhaps rather too broad, views which have been taken with regard to the last great war of 1870-71. I think we shall probably find in the next war, unless it happens over the same ground, that there will be a great deal of close quarter fighting. Battles will not always be fought over perfectly open ground, such as you see at Vionville, Gravelotte, in the greater part of Wörth and at Weissenburg, and if there is fighting in a close country, above all, if there is, as we hear there is likely to be, great use of night attacks, I must say I do not see how close quarter fighting is going to be avoided. I speak with all due respect to better judges, but I think it will be found

that in a *mêlée* of any kind, whether by day or night, a sword is a much handier thing to use than a revolver. I do not think the statistics we get with regard to the 1870 war give one any reliable result with regard to the amount of casualties that occurred in the various engagements where either the sword or the bayonet was much used. The day before yesterday, after considerable trouble, I succeeded in finding out that the last published book on tactics, Baker's "Tactics," gives 0·08 per cent. as the amount of wounds by sword or bayonet. But that applies to the whole war, and, I think, if you were to take it as being universally true that the casualties in no engagement exceeded 0·08 of the force engaged, you would get just as wild a result as you would get if you generalized from the results (which I only happened to come across this morning) that in one particular battle, at Chenebier, by one single mitrailleuse discharge, twenty-one men were knocked over, while if you look at the statistics in the same book you will find the total loss by mitrailleuse fire was something like 0·05 per cent. There is one particular application of swordsmanship which I think comes closer to us as Englishmen than to any other nation, that is, swordsmanship in savage warfare. On the 23rd March, 1885, the battalion to which I belonged marched to MacNeill's zareba. The battle had taken place the day before. I came across a friend in one of the regiments which had most distinguished itself in the fight, and I asked him "how he had got on." "Well," he said, "when the rush came I was knocked over. I got up again and saw a big Arab coming at me. I knew I was no good with a sword, so I took my revolver and fired at his stomach,—and hit him between the eyes." There is another argument against the revolver, and that is that it is absolutely inefficient against a savage, who has got great tenacity of life. Over and over again—I dare say some in this room have seen it—a savage has been seen to charge with blood spurting out in half a dozen places from bullet hits. If he does not happen to be hit in the right place it does not stop him when he is well on the rush. I dare say there are plenty here who can give a like experience. Again, in Afghanistan and Burmah, we constantly hear of hand to hand encounters, generally on a small scale, but still very important to the man they happen to, and I strongly suspect some advice which was given to some of us in 1885 by one of the Soudan residents will apply in most of these cases. What he said was, "Never you try to get your point in first. You must parry the other fellow's first cut. If you do that you have got him. If you run him through he has got you, because you won't stop him." I am thankful to say I have never myself had occasion to make use of his advice. That is possibly the reason I am here now. There is one point about almost all our infantry swords which I think worth drawing attention to, and that is a want of symmetry in the hilt. It is unequally sided; there is much more weight on one side of the guard than on the other. If you handle one of these swords you will find a tendency, suppose the back of one's hand is up, for the edge to turn down, unless you hold it extremely tight. If you make a cut with it, the moment the edge encounters any resisting substance you will find that tendency becomes still more pronounced. If you take a sword with an equal guard on both sides you will find the tendency does not exist, and the difference it makes against another man, an even guard against an uneven guard, is something astonishing. Therefore, I should like to recommend that, if possible, all swords should be made with a symmetrical guard.

Colonel CLEATHER: I want just to say a word or two about the public schools. I quite agree with Captain Hutton that the army classes in public schools should be taught fencing and sword play. I think I may be allowed to say that the headmaster of the Harrow School is quite willing that this should be done. Although, as he says, he finds it very difficult to fit in this work with other studies, he appreciates the importance of the subject, and, I feel quite certain, some day or other it will be carried out.

Major R. C. B. LAWRENCE, King's Dragoon Guards: Gentlemen, there was one point Captain Hutton mentioned about cricket. I should be very sorry if anything interfered with cricket, "our national game," but I do not think fencing need do so. With regard to what we heard just now about the tactics of the next war, it seems to me that the first thing which will happen will be great engagements of cavalry. If all other things are equal, when the cavalry meet, the result must be a

mêlée, and from that struggle the best swordsmen will most probably emerge victorious. I dare say many of you have read a most charming old book, by the late Captain Nolan, on "Cavalry." In that he speaks of an engagement that occurred, during the time he was in India, between the Nizam's cavalry and the Rohillas, and he mentions that arms and legs, and even heads, were cut off as if by giants. He found that the Nizam's cavalry were armed with old English swords, swords cast by the British cavalry, and mounted by the natives for their own use, but they were kept in wooden scabbards. Captain Nolan inquired how these men were taught to cut. The answer was, they were not taught at all; "a sharp sword will cut in any man's hand." That brings me back to the question of scabbards. The scabbards of European cavalry are of metal, for the sake of durability and appearance; the result is that we cannot hope to keep our swords sharp, and therefore we must trust more to the point. Now, nothing will teach us to use our points so effectively as fencing. Fencing I believe to be the best lesson for this. Human nature's first instinct is to strike, but it is no use striking (*i.e.*, cutting) if you have not got a sharp sword, and we shall not point effectively unless we are taught by a long and hard course to do so almost instinctively. My own personal experience has been this. I have been through a course of fencing two or three times under military instructors, and thought I was getting on pretty well. I came up to town recently and put myself in the hands of a Frenchman. I found that he was like a cat playing with a mouse; he could do anything he liked with me. I felt as if I were a child at the game, and had to begin again at the beginning. With regard to the training of cavalry, I do not think we want gymnastics quite so much as the other arms of the Service, because our men are constantly hard at work physically. Their horses have to be groomed every day, and they have to ride a great deal, which keeps them strong and fit. The fencing would also tend to keep them strong and give them greater confidence in their arms, and the more confident they were in the use of their weapons the more irresistible would they be. With regard to the interest the subaltern officers take in it, in my own regiment, at present, nearly all the subalterns attend fencing every evening from 6 to 7. It does not interfere with duty, hunting, or anything else of importance, and I do not see why this should not be done always, and with the best results. I think the subject is one that has not commanded much interest in the past, but I hope, as Captain Hutton has revived the question so well, that interest may be reawakened. We do want a book. I have heard an instructor lately complaining that the book was out of print, and that he wished to have something to refer to. I hope we may soon get some good standard text-book that they may go by, in the absence of more practical instruction.

Major WALLER ASHE: Lord Methuen, ladies, and gentlemen, it is with great pleasure that I have heard the lecture delivered so admirably by my old brother officer, Captain Hutton, and I shall be pleased if he will allow me to make one or two remarks with regard to my own experiences of swordsmanship in our army. I was educated abroad, at the College Henri Quatre in Paris, and, having been a pupil of Grisier, when I joined my first regiment I brought all my foils and masks with me, and for nine years I carried these foils and masks about as part of my impediments, and never met a single brother officer who cared or wished to fence! At the Cape, when with the 85th Light Infantry, I remember a field day, when General Sir James Jackson, an old Waterloo officer, was commanding, and seeing an infantry Colonel—I won't say my own Colonel, because he might be here to-day—attempting to draw his sword *under* the bridle-arm, the General called out to him, "You will cut your arm off, Colonel!" It never struck the Colonel that he ought to draw his sword *over* the bridle-arm. So little did he know of the weapon he wore. As Adjutant of the same corps I had to teach the officers the regulation sword exercise of those days, and when I had got my pupils into good order, a squad of thirty or forty, every single stick coming down in unison, and thought I had trained them to perfection, the inspecting field officer said to me *sotto voce*, "Did you ever see such a deplorable spectacle?" I think the same thing has been alluded to by my late friend Sir Richard Burton, in his admirable remarks on "Sword Exercise," as practised in the British army. On joining the King's Dragoon Guards, I found the swordsmanship a little better. My friend on my

right, General Marsland, was my subaltern at that time, and he and I did have a bout or two occasionally with singlesticks or sabres, but I do not think he cared much for the point or foil play. In the King's Dragoon Guards I took the trouble to consult my sergeant-major, and presented foils, masks, and singlesticks to the men of my troop, when I found they were only too glad to get an opportunity of learning to fence when they had any officers to teach them and give the example. Colonel, now General, Sayer was my Commanding Officer in those days, and, I am proud to remember, he commended me very much for the trouble I took and the example I set. I hope Captain Hutton's eloquent lecture will lead to a real revival of this splendid and noble art. I fenced with Angelo when he was ninety, and he certainly was not a decrepid old man, nor did he suffer from curvature of the spine from fencing. In conclusion, I am very glad to have an opportunity of saying this at Captain Hutton's brilliant exposition, seeing that we have a practical swordsman like Lord Methuen, now Commanding the Home District, in the chair, as such a conjunction does not often occur as getting a good lecturer and a good chairman, both masters in the noble art of fence.

Captain CYRIL MATTHEY, London Rifle Brigade: Captain Hutton has told us that the want of enthusiasm for swordsmanship is a good deal due, in the first place, to the apathy shown on this subject by the authorities at our public schools. This was undoubtedly the case in the public school where I was brought up about twelve years ago, and I do not think it has altered since then. We had our army classes there, but I do not think anything whatever was done in conjunction with them to train the boys physically. Some few of them who were enrolled in the school rifle corps were trained in the rifle exercises, but that was not as compulsory as it should have been. With regard to the art of fence as *taught* in the school, we had an instructor who came down once a week in the afternoon, and during the few hours that he was there he had to give lessons in foil fencing only to the very small number of boys who turned up to take their lessons. It was essentially, for so I must call it, an "unpopular sport." Possibly the reason of its unpopularity was that cricket and football were naturally the games mostly played there, and if a boy wanted to take his lesson in fencing he had to give up any chance of playing cricket or football for the afternoon, and, as fencing was so totally unrecognised as a sport by the authorities of the school, he preferred to give up any desire that he might have to become proficient in fencing, and take up a much more generally recognised game, like football or tennis. Another reason for this disinclination of the schoolboy to take up fencing may be that it is more of an indoor game than an outdoor game; but that there is first rate material in the public schoolboy of which to make swordsmen I am quite certain. In our rifle corps armoury there were always a few singlesticks and basket hilts lying about, and at various times, when nothing much was going on at intervals between school hours, a few boys used to get together there and began "tapping at one another" with these singlesticks, but as nothing was ever taught them, no kind of instruction whatever, no errors corrected, although the drill instructor was there nearly all the time, the result was most decidedly as unscientific as it could be. If the boys were properly encouraged by the authorities in the same way that they are for other athletics, I am certain a very great deal might be made out of the art, and that they would then go up to Sandhurst or Woolwich or into civilian life, at any rate better grounded in the art of fencing than they are at present. A few words more on the subject of the French system and the English system of fence. From what I have seen, there is no doubt that the French military system is the best, and what leads me to think so, and to be certain of it, is that I never yet knew a man who had been taught by an English military instructor, and had subsequently gone to a French instructor, leave that Frenchman and go back to the English military instructor. I never knew a man who began fencing with a French instructor throw him up for an English military instructor, but I have known very many cases of the opposite, and I think that speaks volumes.

The CHAIRMAN (Lord Methuen): I think we now have had a very full discussion of an able character, and it is a subject on which I am glad to say a few words, because I have two letters here of value, and contradicting to some extent the remarks that have been made with regard to the apathy that is shown by head-

masters in public schools as to the noble art of fencing. I was writing to Dr. Warre, the head-master of Eton, on quite another subject last week, when he did not even know that this lecture was to be delivered, and he writes to me as follows: "On the physical side there are two things which should be encouraged which now are not encouraged, and often are begun too late. No. 1. Physical drill of a certain kind, tending to set up the frame and expand the chest. N.B.—Do not advocate gymnastics for boys. They have games, and Nature requires that something shall be kept in reserve. Gymnastics are quite right from nineteen to twenty-five. Swordsmanship: this ought to be encouraged for boys. They can learn it quickly, more quickly than men. It is good for eye and hand, and it is also helpful in after time." So much for a head-master of a school and apathy. Now I received a letter from General Keith Fraser, Inspector-General of Cavalry, containing the following words: "(1) I agree with Captain Hutton as to the immense advantage it would be to boys destined for the army and the army classes in public schools if they were obliged to go through a course of instruction in fencing. I can speak from personal experience of the value of learning early in life from a good master, though for many years after I did not again fence." Gentlemen, I deprecate strongly anything that would interfere with the open-air games of the public schools. I say, and I believe I carry the feeling of this meeting with me, that it is those games that are played on the playing fields at Eton and elsewhere that lead our officers to honour and to glory; it is those games that make leaders of men, and there is a healthy rivalry, there is a fascination, there is an excitement and an uncertainty about games like that to schoolboys which, I contend, fencing will never give. I speak as one who has been fond of fencing himself, from the time that he joined. I perhaps took up fencing because I did not approve of my face being made a movable target for the long or short range for professors of the noble art of self-defence, and therefore quitted boxing for fencing, but I cannot name to you two exercises that I think develop mind and body more than boxing and fencing. Whether it could be possible for the authorities to force candidates for Sandhurst or Woolwich, or passing through the Militia into the army, to go through a qualifying examination in fencing, I cannot say, but I think it would be an inestimable advantage. I think that the amount of fencing that could be learnt at a public school, as Captain Hutton says, in three hours per week could not interfere with the outdoor games, and I believe that if you are to introduce any system of fencing into our army it will be extremely difficult to find the material on which to work, unless you induce the boys in public schools to learn, as General Keith Fraser says, when they are young, and to be capable of receiving the tuition that they will get from Frenchmen. It is not an exercise, believe me, that it is at all pleasant to learn beyond a certain age. It is not an exercise that I advise people after thirty to take up. Fencing and gymnastics, I contend, do not go together. I feel quite certain that Captain Hutton had no wish whatever to say an unkind word about anybody, alive or dead, but there are duties that men have to do; they have to speak out, and the great harm that is done in this life is when a man has an opinion of his own and is afraid to state it. It is not Mr. McLaren, it is not General Hammersley, it is not Colonel Fox that Captain Hutton is speaking about; it is the general system and the way that fencing is taught in England. I contend that fencing is not an English growth. It is no more popular in England, or Germany, or Austria, or Russia, than cricket and other outdoor games are in France. It is a growth of France, of Spain, and Italy. It will not be a plant that you will find grow naturally in England. You will have to nurse it, and if fencing is to gain the place that it should occupy, I contend that it is for us officers in the army to induce the authorities to give us good masters, to give us our *salles d'armes* in London, if you like, for fencing practice; but let it be clearly understood that in six months it is impossible for any one to learn fencing and gymnastics together. It is not the fault of the officers, it is not the fault of the teachers, that fencing does not occupy the position that it ought in the army; it is I think because we have not yet shown ourselves sufficiently energetic, or have not put sufficient pressure on the authorities to induce them to come and aid us to teach what we wish to learn. Now, gentlemen, I have nothing more to say, unless you will allow me to read a little more of General Keith Fraser's letter: "It is utterly impossible to train com-

petent instructors under our present system of combining gymnastics and fencing, giving the greatest importance to the former, and trying to train competent instructors in six months. I know how zealously and perseveringly many of our army fencing instructors work, and I always feel sorry for them in giving class lessons. I am sure that the system of some foreign armies of individual teaching, both with regard to equitation and swordsmanship, is the right one. Until we have established a thoroughly good school of fencing in England we must go to France or to Italy for instruction. In my last regiment, the 1st Life Guards, in the fifties and sixties, there were some famous swordsmen, such as St. John, and so on. In conclusion, I have only to say this of fencing, that those who have once taken it up will find it almost the only exercise that I can think of now that will see them through life." Up to fifty you are as quick as you were at twenty; from fifty to sixty you imagine you are as quick, although in reality you find you neither gain hits nor acknowledge hits with the same quickness that you did when you were younger. But it is the one exercise that, I contend, in no way taxes the brain. I have gone away from my office, perhaps having done as much work as some for a good many hours, and I have gone to the school of arms with tired brain and body, and I have been able to go home and feel that that hour's fencing has set me straight for doing another two hours' work if I wish it. I tell you it is unfair to fencing to say that it will either give curvature of the spine or affect the brain in any way. I have simply to finish by thanking Captain Hutton for his lecture, and also all those gentlemen who have assisted in its discussion.

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FOREIGN SECTION.

THE CONTEMPORARY NAVIES OF THE EUROPEAN POWERS: THEIR ELEMENTS OF POWER, GUNS, AND ARMOUR.

(Extracts from an Address by Lieutenant-General PESTITCH, at the Academy, St. Petersburg, 30th March, 1892, and reproduced in the "Revue Maritime et Coloniale.")

It is very difficult to give a just idea of the brilliantly sustained argument and most interesting discourse which is published in the "Revue Maritime et Coloniale," of January last, under the above title, and which has been translated into French by Lieutenant-Colonel Michael Levitzky, of the Russian Marine Artillery; with a view, however, of inducing naval officers who are sufficiently conversant with the language to study the original article, it will be well to make a few extracts.

The veteran author, who is more than 70 years of age and has seen fifty-five years' service, commences by drawing a comparison between the old navies composed of wooden sailing ships, and the navies of the present day; but, he says, they both have the same end in view—to injure the enemy as much as possible, the means only by which the end is reached differ. After tracing the causes which have given rise to the present multiplication of types of ships, guns, and armour protection, he goes on to say that the system which is adopted in the army, of replacing one type of gun by a later one, cannot be carried out on board ship, even by a nation so rich as England. The concentration of all the maritime forces available, the grouping together of the greatest possible number of ships and of guns, this is the end of all naval tactical manœuvre, and this is quite in accord with what is the essential aim of all tactical manœuvre in the army on shore. But then in the case of the mobilization of naval forces we shall have to group together, and bring to the front in action, a heterogeneous collection of ships constructed at various intervals during a period of thirty years; we shall have fast ships and slow ships, heavily armoured and lightly armoured ships, and ships entirely unprotected; and, as regards their armaments, guns of types and calibres of the utmost variety. "The commander of each ship would therefore find himself in a position which we may call an isolated one, and we may ask, how can conditions so diverse be made to agree with the exigencies of naval tactics at sea? This question is outside the limits of our study, and I leave it to the gallant Admirals and Captains of all navies to decide, how in time of war they would manœuvre together a combination of material so *hétéroclite*. Whatever may be their reply, I can say decidedly that this state of affairs, common to all the navies of Europe, this absence of uniformity and regularity in the construction of the tactical units, is unique in history. This organization, when one can appreciate the tactical qualities of the contemporary navies, is perhaps the cause of the divergence of

opinions we meet with in all the navies of Europe. This variety of opinion may be considered to be natural, but all the changes made during the last thirty years have not been the result of experience gained by actions at sea; they have been made in accordance with personal views, and these views have changed from one person to another, and often also from one epoch to another."

The history of the old navies of sailing ships which have served their time has for our instruction the highest value. It shows us that the basis of their organization was founded, not on a series of theoretical speculations, but rather on the experience gained in sea fights rich in precious teachings on what ought to be the naval artillery of the day. The idea of grouping the greatest possible number of guns on all ships of whatever class they might be, was the fundamental principle which guided their constructors, and which lasted through all the period of the existence of sailing ships in our navies. This system was very reasonable, although the armament of wooden ships gave rise to such difficulties and obstacles as our present constructors have very little idea of. To place 100 guns on board a vessel not more than 180 ft. long, the distance between the ports could not be more than 10 ft.; the ships were high, and with three or four decks forming so many batteries, and not only the Lieutenants, but also the Admirals themselves, gave up all idea of comfort in their cabins to make room for one or two guns for which space could not be provided elsewhere. This proves the importance which was attached to the possession of an extra gun, and with what constancy every effort was made to realize this preponderance of guns, through entire centuries.

After giving many instances taken from actual engagements, he cites the remarkable words of Admiral Dupon, taken from his report on the attack on Charlestown in 1863, in which he engaged the forts with eight ironclad monitors and an ironclad frigate, with an armament of 8 6-in. and 22 11-in. guns, to which the forts could only reply with 74 smooth-bore guns of different calibres: "In undertaking the attack, I had hoped that the armour would have been quite a match for the projectiles. But when I had seen that in a short space of time the half of my ships were no longer in a state to continue the action, I was convinced that with a few guns and slow fire to continue the fight against 100 guns of the enemy, however weak in calibre, was impossible. My only care then was to beat a retreat with my ships as soon as possible from this dangerous position." Unfortunately the Federal Government, and later the navies of all other countries, paid very little regard to this report.

After showing that with the old sailing battle-ships, the weight of their artillery reached from 20 to 23 per cent. of their displacement, the General remarks that in the present battle-ships, the weight saved by the abolition of masts, &c., is equal to 10 per cent. of the displacement, yet so much of the displacement is absorbed for protection and speed, that only from 8 to 4 per cent. in the English navy, 9 to 4 per cent. in the French, 11 to $4\frac{1}{2}$ per cent. in the Italian, and 10 to $4\frac{1}{2}$ per cent. in the Russian navy, is devoted to the weight of the armament. As regards the speed, he says, "Can 3 or 4 knots compensate for the

loss of a certain number of guns? What is the precise value of this factor in tactics so much talked of lately? Without entering into details, I will only say, that in squadron engagements, especially if acting on the defensive, with vessels of different speeds, speed can have no decisive value, and armament ought not to be sacrificed for it." As regards the armament, after noticing the backward movement which has taken place from 100-ton guns to those of 67 and 50 tons, he says, "But those are only half measures, and the calibres now adopted by the English are not the most advantageous." A long comparison of guns and weight of projectiles thrown by each in a given time is then entered into, in which the author seeks to show that the strength of the fleet is not that of individual ships, but a factor composed of the strength of the whole collection of individuals, and that the power of the artillery is to be determined by the number of projectiles penetrating the hulls of these individuals. A simple calculation will show us that four 12-in. guns can fire 28 shots in an hour, of which 20 per cent. will hit the enemy; and in the same time thirty 6-in. Q.F. guns, with a rapidity of fire of one-fifth the maximum, will fire 3,600 shots, of which 15 per cent. at least, or 540 projectiles, will hit the enemy. But the area which can be pierced by 6-in. guns in the English fleet will be about 80 per cent. of the total area fired at; deducting, therefore, 20 per cent. of the hits, we still have a total of 432 which penetrate the hulls of the enemy. "An entirely false idea of the effect of heavy projectiles on armoured ships has been produced by the experiments on armoured targets; as in the first place I have shown that only one projectile an hour would strike an armoured area of 830 sq. ft., while three, four, or five shots are fired at a trial plate not more than 40 or 60 sq. ft. in area." Numerous examples taken from historic actions are then brought forward to show how difficult and how rarely it was that a ship was actually sunk by gun fire, and certainly the difficulty and rarity of the occurrence would be none the less in the present day with the provisions of double bottoms, bulkheads, and large pumping power, &c. The author next compares the effect of small rapid-firing guns of small bore, machine-guns, &c., with the 6-in. gun, arguing in favour of the latter, even for repelling torpedo attack; because of the small percentage of hits in such cases which experiments have shown to be probable, he says all the powers of the ship should be brought into play; for this reason a special form of case shot, "*boîtes-à-mitraille*," has been invented, and prolonged experience of it has shown its excellent qualities. Comparing these "*boîtes-à-mitraille*" with the projectiles from Gatling guns, &c., we shall be convinced of the advantage the 6-in. gun has over all kinds of mitrailleuses, revolver-cannon, &c. The translator says in a foot-note that "*the boîtes-à-mitraille*" of General Pestitch are very long (30 to 50 in.), and contain from 33 to 144 steel shot, $2\frac{1}{4}$ to 4 lbs. in weight; the body of the case is of bronze, with a belt at the base, and they have calibres of 6, 8, 9, 11, and 12 in.

"Let us imagine ourselves in the presence of two ships differently armed; our thirty 6-in. Q.F. guns firing for two minutes with 4 shots a minute, will have discharged 240 case shot; each shot contains

33 balls, weighing about a kilogram each, and can penetrate the torpedo-boat at an angle considerably removed from the normal. Then on a length of 800 metres, and a width of 200 metres, we shall send in two minutes nearly 10,000 balls, which will ricochet on striking the water, and it is across this rain of bullets that the torpedo-boat must pass. This effect could be produced neither by the present mitrailleuses, nor by reason of their slow discharge by 12-in. guns, although their case shot are charged with 144 balls each; so that against attack by torpedo-boats there is no better defence than the 6-in. Q.F. gun charged 'à mitraille.' The 6-in. gun is then a universal arm, and will serve as the uniform armament for all vessels of war; it is well understood that I do not touch on the question of small-bore rapid-fire guns for use in military tops." The author then goes on to examine the question of the disposition of armour, and sums up by saying that this idea of defence by armour necessitates the reduction of the power of the armament, and we should conclude that this is a fatal mistake, and may be painfully proved to be so to those who are not wise enough to remedy it in time. Our century of armoured ships reminds one of the days of chivalry; the exaggerations of invulnerability of the two epochs only injure all the other tactical elements of the armament, and as soon as the days of fire-arms arrived, chivalry abandoned heavy armour, but the mobility of the cavalry of the time furnished an active force, of which all armies appreciated the effect. The enormous quantity of shells from the 6-in. guns can silence the enemy without in any case having pierced the armour behind which his heavy guns are sheltered; no gun can annihilate a modern ship, whether she is iron-clad or not; the weight of the ship should then in preference be utilized, not for passive, but solely for active, defence.

"I do not wish to bring back the old cast-iron guns without weight or range. I have told you the guns we require, and we have them. The material losses, the moral dismay of the enemy under a hail of shells exploding about them, all this proves that it is not the passive defence we require, but rather the active. Without ever having made a single breach in the redoubts where the guns of the enemy are enclosed, a good artillery fire can reduce the adversary to silence in a very short time with the enormous weight of shell which can be poured into him from the 6-in. guns. The weight of the ship, then, should be utilized in preference, not for passive, but for active defence. In our present ships 33 per cent. of the displacement is taken up by armour defence. If we deduct 13 per cent., necessary for the protection of the engines, the remaining 20 per cent. is for purely auxiliary protection. If, then, we add 15 per cent. to the weight of the armament, we shall have for the relative weight of the artillery not 10 per cent. as at present, but 25 per cent., and a ship of 10,000 tons can carry 88 long 6-in. quick-firing guns with a double supply of ammunition.

"I believe I have exhausted all the points for the just appreciation of the elements of power in the contemporary navies of European nations, and here are my conclusions:—

"1. The power of naval artillery should be measured not by calibres, but by the number of projectiles entering the hull of the enemy.

"2. Projectiles of the largest calibres cannot have any influence in the submersion and destruction of a ship of modern construction.

"3. The most advantageous calibre for marine artillery and coast defence is about 6-in. with long-range quick-firing guns.

"4. The diversity of armament of ships-of-war is a source of weakness.

"5. The grouping of the maximum number of guns on board a ship, no matter of what class, should be the principal idea in the armament of modern ships, as it was for those of old times.

"6. With the exception of the protection of the vitals of the ship, which in the present day is limited to the engines, the remainder of the available displacement ought to be used in augmenting the power of the armament."

The discussion was taken up by Rear-Admiral Makarov, who, although only 43 years of age, has been three years an Admiral, has already distinguished himself both by the pen and the sword, and at present occupies the position of Inspector-General of Marine Artillery. After paying a tribute of admiration and respect to the author, and quoting the words of Admiral Farragut with reference to the introduction of iron ships, "Give me a good ship of wood and put iron into the men," he says: "These words are profoundly true, and it was a man grown grey in battle who uttered them. But we have been forced to advance as exigencies arose, always forward; to stop is to go backward; but we can so advance as ultimately to arrive at our point of departure. For all the movements of guns we wish to-day to have recourse to hand power, but we are not yet ripe for that. When all the parts of the gun and gun mountings have been brought to the desired perfection of equilibrium, then, no matter what other motive power we have, we shall have hand power as well. General Pestitch is not an enemy to natural progress in artillery; on the contrary, he has worked hard in this direction; we therefore owe peculiar deference to his opinions.

"With regard to weight of artillery, our vessels have the advantage, as the General points out, over the English ships, but my calculations are somewhat different from those of the General, although they have the same sign, and the comparison, therefore, loses nothing. Our Black Sea armoured battle-ships, according to my estimate, carry a weight of artillery equal to 12·7 per cent. of the total weight of the ship: the new English vessels of the 'Royal Sovereign' type only 9·7 per cent. If we compare the cruisers we shall still find a great advantage in favour of ours, taking, for instance, the two cruisers constructed in 1887.

"Admiral Nakimov,' 7,781 tons, eight 8-in., ten 6-in. guns; percentage of artillery 8·7 of total weight of ship.

"'Impérieuse,' 8,400 tons, four 9·2-in., six 6-in. guns; percentage 5·7.

"Of two cruisers now actually in construction:—

"'Rurik,' 10,500 tons, four 8-in., sixteen 6-in., six 4·7-in. guns; percentage of artillery 7·2.

“‘Blake’ and ‘Blenheim,’ 9,000 tons, two 9·2-in., ten 6-in. guns; percentage 5·4.

“Our vessels, then, yield nothing to the English in this point; in fact, they have the advantage, and this has been obtained mainly by the advocacy of General Pestitch. Our ships must evidently be steam-ships, and of sufficient speed so as not to be left behind; 18 knots, say, or the speed of our ‘Rurik,’ which I will take as an example. The engines and boilers take up a length of 192 ft. of the largest part of the hull, and if we could remove engines, boilers, and coal bunkers, and fill the basin thus formed with water, we should be able to anchor the 44-gun frigate ‘Aurora’ in it, of which you have heard to-day, and still have space left for her boats around her; but the engineers hold this space and will not give up a single inch of it; on this point they are firm, but it must be said that they have been restricted to the last extremity. In the engine-rooms, to avoid the connecting rod one comes into collision with the starting lever, and in order to feel the bearings to see that they are not heated the chief artificer needs to be a regular acrobat, while the stoker, obliged by forced draught to get double out of his boiler what could be expected of it from its dimensions, needs yield nothing in energy and passive resistance to the devil himself. There are, then, 192 ft. for the engines, 12 ft. for torpedoes, 108 ft. of battery deck for artillery, and there only remain 124 ft. of the enormous length of the cruiser, and this in the narrowest part of the ship. We could, certainly, bring up the provision and store rooms higher, but we cannot touch the steering gear and steering engines, which must be below the water line. Yet here, compass in hand, I have calculated how we could stow cartridges for 6-in. guns, and I have found that the utmost limit to which the artillery of the ‘Rurik’ could be augmented would be by an additional six 6-in. guns, or to 8·7 per cent. of the total displacement. General Pestitch is a hot partisan of 6-in. guns; our battle-ships carry them for auxiliary, our cruisers as their principal armament—the ‘Rurik’ has sixteen. The struggle between guns and armour is still fresh in the memory of all of us; the gun has conquered and the constructors have to resort to partial protection, but to prevent the enemy having ships armoured from one end to the other we must have heavy guns, for if we give up guns of large calibre, we shall soon see ships completely protected with 12-in. armour, against which our 6-in. guns would be powerless. General Pestitch declares that he has not much faith in armour, and he finds that there is no safety behind it. Armour has appeared in consequence of explosive shells, and, if an international congress would reject as material of war all projectiles of pyroxyline and dynamite, the day of armour would be past; but, alas! we are as yet very far from such an international agreement. Nevertheless, the teaching of General Pestitch is worthy of all attention; he says we should rely rather on the sword than on the shield, and I believe that the assembly will agree with me in thanking the gallant General for having laid before us this exposition of principles so much in sympathy with the spirit of all fighting men.” (T. J. H.)

THE BATTLE-SHIPS OF ENGLAND.

(Extracts from an article in the "Revue Maritime et Coloniale.")

THE above is the title of an interesting article in the January number of the "Revue Maritime et Coloniale," by Prosper Simon, Lieut. de Vaisseau, in which the author commences by observing that at the time when the first ironclad of 14,000 tons has entered into service under the programme of 1889, known as the Hamilton programme, it is interesting to pass in review the English battle-ships and the sequence of ideas which has led our neighbours on from the "Devastation," prototype of all the mastless ironclads, to the present type represented by the "Royal Sovereign." Starting with the "Devastation," "Thunderer," and "Dreadnought," classed as ironclad turret-ships, he remarks that the separation of the artillery into two separate positions, and the protection of the base of the turrets by the armour, formed the principal points of departure in the "Devastation" from previous ships. These two arrangements have, in fact, served as the model for all the English battle-ships, with the exception of the "Admiral" class, in which our system of barbettes with the base of the gun platform unprotected has been imitated.

"The 'Devastation' marked the greatest advance in the way of protection since the adoption of armour; it having taken ten years to advance from the $4\frac{1}{2}$ in. of the 'Warrior' to the 8 in. of the 'Triumph,' while at a single bound, in the case of the 'Devastation,' an advance was made to armour of 12 in. in thickness, or $1\frac{1}{2}$ times thicker and $2\frac{1}{2}$ times the resistance of our ironclads of the 'Océan' type, with which she was contemporary. After enumerating the defects of this type, which have been fully discussed in England, and which he says resulted in the 'Devastation' being withdrawn from the list of sea-going battle-ships and relegated to coast defence duties, the author passes on to the 'Dreadnought,' which he calls an enlarged and improved 'Devastation'; the improvements being, 1st, In the width of the redoubt, which, instead of being isolated in the middle of the deck, was made flush with the ship's sides. 2nd, The height of the upper works was made the same as that of the redoubt throughout the whole length of the ship. 3rd, The height of free-board was increased from 9 ft. to 10 ft. 6 in. 4th, The maximum thickness of the armour belt was increased from 12 in. to 14 in. (an increase gained, it is true, at the expense of the extremities), and its upper edge before and abaft the redoubt was raised to 3 ft. above the water line; the limit to be adopted later in all belted ironclads. It was desired to raise the forward turret and to place the turrets diagonally, so as to give an all-round fire, and to enable three guns at least to be trained in all directions; but the work was too far advanced to permit of this being done, and the latter arrangement

was carried out in the battle-ships of the next class, viz., 'Inflexible,' 'Agamemnon,' 'Ajax,' 'Colossus,' and 'Edinburgh,' the 'central battery' ironclads. The English were led to this disposition of the armour, which only protects a very small proportion of the water line, by the impossibility of giving a complete protection of the thickness decided on to the 'Inflexible,' 24 in., or double that of the 'Devastation.' To summarize, it was desired to construct a most formidable battle-ship with armour of enormous thickness, and carrying the most powerful guns in existence. Arrangements were, in fact, made to allow of her armament of 80-ton guns being replaced by those of 160 tons, but this hoped-for consummation was never reached. As regards the armour, it was not considered possible to make such plates in one thickness, so they were made in two thicknesses of 12 in., separated by 11 in. of teak, which the English have christened 'sandwich fashion.' The 3-in. protective deck on which the citadel rests extends from end to end 6 ft. below the water line, which is far too low, as in such a position its utility is *nil*; its level ought to have been raised at each end of the citadel. The line of flotation is thus for two-thirds the length of the ship absolutely without protection, and the problem of her stability in case of the destruction of her extremities by artillery fire, though raised, has never been frankly solved; but, in any case, it was decided to give to future ironclads of the same type sufficient excess of stability to do away with all fear on this point; and the 'Agamemnon' and 'Ajax' are consequently reduced 'Inflexibles,' with greater stability of platform, but extremely quick and uneasy in rolling on account of this excess of stability, necessitating the addition of bilge keels. The 'Colossus' and 'Edinburgh' are the same as the above, except that they are slightly longer with increased displacement, but having the same defects. These have the advantages that they are constructed of steel, have breech-loading guns, and have made 16 knots on their trials, *But it is always necessary to add a note of interrogation after the English speed.*"

"The 'Collingwood,' 'Rodney,' 'Howe,' 'Benbow,' 'Camperdown,' and 'Anson' were built in opposition to our 'Indomptable' type, with the same position of ammunition hoist, and the non-protection of the base of the barbettes. They have been accused of the following defects:—(1) Insufficient freeboard, rendering them uninhabitable by the crew in heavy weather, and with the necessity of slowing down if the forward guns are to be used. (2) Instability of platform (the 'Collingwood' has rolled 20°). (3) The armour belt too short, and, above all, too low, having been reduced from 3 ft. to about 16 in. above the water line by the additions and alterations made during building. It has been calculated that in these conditions if the unarmoured ends were flooded during an action the belt would disappear, and the ship might be obliged to surrender with her belt, barbettes, and engines intact. These considerations have led to the 'Trafalgar' and 'Nile,' two of the most interesting ships of the English fleet, as they bear the marks, more than any others, of this spirit of progression or evolution

which guides our neighbours in their naval construction. From the 'Devastation' to the 'Admiral' class this spirit holds, in spite of the difference of types; the study of the one leading to the construction of the other; the 'Trafalgar' profited by all these experiences, and to combat all the defects of the 'Admiral' class, insufficient protection of armament principal and secondary, with armour belt both too short and too low, reference was made back to the 'Dreadnought.' The 'Trafalgar' is the 'Dreadnought' from which the armour belt has been taken away forward and aft, so as to leave only 68 per cent. of the line of flotation protected, and with the superstructure transformed into a battery extending between the two turrets. As it was decided to alter the armaments of the battery from 8 5-in. guns to 6 4·7-in. quick-firing guns, considerable modifications were rendered necessary during construction, resulting in a reduction of freeboard to about 10 ft. 6 in. or 8 in. less than in the 'Admiral' class. This insufficiency of freeboard is, on the whole, the only fault which has been found with these ships of the 'Trafalgar' type, but this defect was found to be so serious in ships with forward turrets that it was decided that higher freeboard was absolutely necessary, although the displacement might have to be considerably increased. We shall see that these ideas served as the basis for the plans of the 14,000-ton ships."

The next ships dealt with are the single-turret ironclads "Victoria" and "Sanspareil," of which the author says they are most striking instances of the exaggerations to which a succession of improvements in perfecting a certain type of ship can lead. These two ships of 10,500 tons are derived from the ironclad ram "Hotspur" of 4,000 tons, which, before developing into the "Victoria," had given birth to a series of ships of the 2nd class; these are examined briefly and clearly as to their principal characteristics by the author, but we will pass on by simply enumerating the ships treated of, which are successively the "Hotspur," "Rupert," "Conqueror," and "Hero;" the "Victoria" and "Sanspareil" being enlarged "Conquerors" with the following alterations:—1st. The armament has been augmented by substituting 110-ton guns for the 45-ton guns. A 29-ton gun with stern fire has been added; the superstructure has been lowered and transformed into a battery of 10 6-in. guns. 2nd. The belt is shortened and only protects 67 per cent. of the line of flotation. 3rd. The redoubt has been reduced, only a ring of armour 18 in. thick being retained for the protection of the base of the turret. The battery, unprotected at the sides, is enclosed forward by oblique bulkheads 6 in. thick, abutting against the protecting ring of the turret at the apex of the enclosure. "These ships have given excellent results on their trials, and have proved very satisfactory as regards strength and perfection of construction, the discharge of their heavy guns having caused none but insignificant damages; they would, therefore, have been splendid engines of war, had not the fault been committed of placing the only two guns of their principal armament in one turret, with the risk of both being disabled by the same shot. They have also the defects of the

'Admiral' class in being too low forward, and incapable of steaming fast against a sea. The 110-ton guns have shown serious signs of weakness, which will necessitate their removal without delay. What will be put in their places? 67-ton or 50-ton guns, perhaps; there will then be a great disproportion between the displacement of the ships and the weight of their artillery."

After recapitulating the various points discussed by the Board of Admiralty, in 1888, as to the features of the new battle-ships, disposition and weight of guns, armour, &c., and the various arguments based on the experience with existing ships and guns, the author gives the result of these deliberations as follows for the new ships. Four 13½-in. or 12-in. guns placed in pairs in armoured barbettes with 18-in. armour, resting on the extremities of an armoured belt of the same thickness, 8 ft. 6 in. in width, of which 3 ft. to be above the line of flotation. Ten 6-in. quick-firing guns, 6 on the upper deck, and 4 in the battery under cover, and protected individually. Armour protection 4 in. thick, afterwards raised to 5 in. in thickness, extending between the barbettes from the upper edge of the armour belt to the battery deck; a speed of 16 knots under natural, and 17½ knots under forced, draught, and a normal coal supply of 900 tons, which could be raised to 1,400 tons. To sum up, the 7 barbette ships of this type follow the "Admiral" class in the disposition of the barbettes, the width of the armour belt, and the position of the closed battery; they follow the "Trafalgar" type in the protection of the bases of the barbettes, the length of the belt, and the position of the upper battery; and they follow both those classes of ships in the non-protection of the sides of the covered battery. They are particularly characterized by their great height of freeboard, 19 ft. against about 11 ft. of the "Admiral" class. The "Hood" is only distinguished from the other ships of this class: "Royal Sovereign," "Empress of India," "Ramillies," "Repulse," "Resolution," "Revenge," and "Royal Oak," by having closed turrets instead of barbettes, and with the consequent reduction of freeboard to about 11 ft. 6 in. "Such are the battle-ships of the first rank in the English navy; as the result of twenty years of study, so long as our neighbours remain faithful to their system of two separate turrets, they would seem to comprise the maximum power which can be obtained from armour-clad ships of this type, of which they are the latest and most superb examples."

The article is illustrated throughout with small profile and plan sketches, showing the disposition of the armour and armament of each type of ship, with tables showing the dates of commencement and launching, the principal dimensions of ship, guns, and armour, and the horse-power of engine, and speed of ship, for each class; the whole forming a very valuable and concise summary of the principal features of our battle-ships. The article is to be continued.

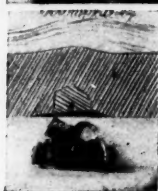
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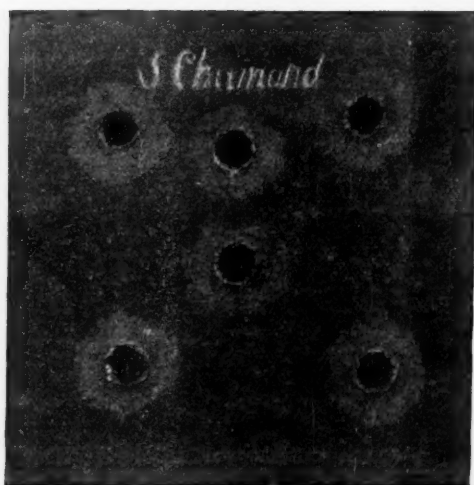
RUSSIAN ARMOR

VICKERS "HARVEYED" PLAT

6th Round.



4th Round.



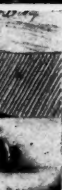
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ARMOUR-PLATE TRIALS.

Plate 17. To face page 543.

"EYED" PLATE. CAMMELL PLATE.

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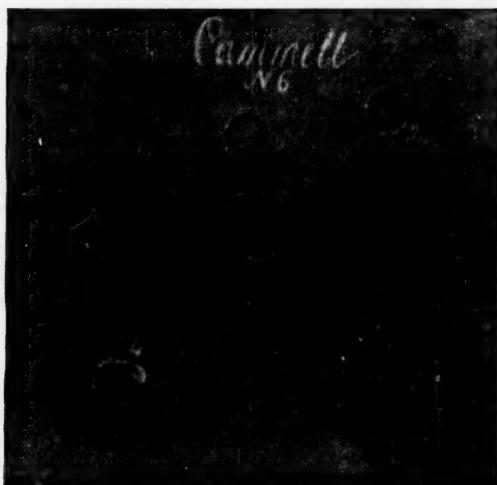
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ST. CHAMOND PLATE.



ELLIS-TRESIDDER PLATE.



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THE RUSSIAN OFFICIAL REPORT ON THE OCHTA COMPETITION.

THROUGH the courtesy of the Editor of the "Engineer," we are permitted to give drawings from photographs taken from the Russian official report of the Ochta competition, together with extracts from the notes bearing on them. In addition to the photographs of the plates are given small drawings, made by the Russian authorities, showing sections of the plates at the points of impact. The photographs selected do not include the Ellis-Tresidder, of which the impression was too dark and indistinct to give a result worth printing. Of the others, the view shows each plate after the competition was decided; that is to say, the Cammell soft plate and the St. Chamond plate after the sixth round, and the Vickers "Harveyed" plate after the fourth round, at which stage of trial it was declared to have shown itself superior to the others. It may be remembered that after this the Vickers "Harveyed" plate was subjected to two rounds from a 9-in. gun, with a striking energy of about 7,700 ft.-tons and 10,000 ft.-tons, instead of the 6-in. shot, with 2,498 ft.-tons. The photograph shows the plate after these crushing blows, which altogether outmatched it. The shots, it appears, were made at the Putiloff Works, and the range was 361 ft.

The St. Chamond plate, after the sixth round, is described in the Russian report as follows:—Condition of projectile: After perforating $11\frac{1}{4}$ in. the projectile rebounded, whole, shortened 0.029 in. Condition of plate: No cracks on face surface of plate, bulging on back surface to the height of 3 in., with a diameter of 17 in. at the base, along the bulging from small cracks. Condition of backing and bolts: Bolts unbroken; on backing local crushing.

Cammell plate after sixth round:—Condition of projectile: Penetrated $11\frac{1}{8}$ in., projectile embedded in hole, evidently unbroken. Condition of plate: Vertical through crack made from upper edge to lower hole; round the hole eight small cracks not longer than 2 in.; on back surface metal bulged to a height of $3\frac{1}{4}$ in., with a diameter of 16 in. at the base corresponding to the cracks. Condition of backing and bolts: Bolt 2 broke; local crushing of the backing.

Vickers "Harveyed" plate after the fourth round:—Condition of the projectile: Projectile broke, wedging into the plate and filling the hole. Measurement showed penetration of the head part to be about 8 in.; on further firing the head part came out, proved quite deformed, and to have penetrated the plate only 5 in. In front of the plate 66 fragments were collected, weighing 32.28 lbs. (English); weight of largest fragment, 4.51 lbs. (English). Condition of the plate: Hole, with broken-off pieces of the crust; on the back surface slight bulging of the metal to the length of about $1\frac{1}{8}$ in. and a diameter of 14 in. to 15 in. at the base. Condition of backing and

bolts: Hardly perceptible crushing of backing; all the bolts uninjured.

Vickers "Harveyed" plate after the sixth round:—Condition of projectile: The projectile remained in the plate, but projected $4\frac{1}{4}$ in. beyond the iron backing. The projectile broke, and its surface was considerably deformed. About 82 fragments were collected, weighing 188.69 lbs.; weight of the largest piece, 73.13 lbs. (English). Condition of the plate: About the hole several pieces were broken off and embedded deeply in the wooden backing, through cracks grouped mainly round the hole on the back surface of the hole, surrounded by projecting combings. Condition of backing and bolts: The bolts holding the target to the deck flew out, and the whole target fell forward with the plate under it; the wooden backing pierced by the projectile, and severely crushed by press of the plate. Owing to the great heat in the projectile on striking, the wood began to smoulder. Judging by the amount of smoke, the backing might have begun to burn if the fire had not been extinguished by water. Bolt No. 12 broke, and nearly all the bolts were bent.

Although the photograph of the Ellis-Tresidder plate is not good enough to reproduce, a drawing is given, which is intended to show the position of the projectile head on the plate, and to represent the condition of the plate at the point of impact of the fifth shot. The remarks on this are as follows:—Penetration of projectile unascertained. Condition of projectile: Broke and stuck in plate as in previous shots; seven fragments collected weighing 19.18 lbs., weight of the largest fragment 6.55 lbs. Condition of plate: From new and partly from old cracks, the left part fell off. Condition of backing and bolts: No. 6 bolt broke; backing uninjured.

These detailed notes bear out the report previously given. The Vickers "Harveyed" plate may be seen to have altogether beaten its competitors; the St. Chamond plate came second, and the Cammell soft steel plate third. The Ellis-Tresidder failed, owing to a fundamental flaw; but its face broke up the projectiles well.

EXPERIMENTAL FIRING WITH 6-CM. (2·36-IN.) QUICK-FIRING FIELD GUNS AT THE KRUPP WORKS IN GERMANY.

;(Translated from the "Militär-Wochenblatt" of February 8, 1893.)

THE firm of Krupp has, within the last few weeks, issued a most comprehensive report on the experiments carried out during 1891 and 1892 with 6-cm. (2·36-in.) quick-firing field guns.

It will be seen that this world-renowned firm has thus entered upon a new sphere of action, its exertions having hitherto been entirely devoted to the construction of quick-firing guns for fortress warfare and for coast defence purposes. One is of course quite prepared to expect a fresh surprise with each new report on the Krupp experiments, but we must candidly admit that we are here brought face to face with performances which, till quite recently, we should have deemed impossible of achievement. We shall, in the following lines, give a summary of the report, together with a critical discussion on the chief points of interest.

The experiments were carried out with two 6-cm. (2·36-in.) quick-firing guns, one being of 30 calibres in length (70·87 in.), and the other of 38 calibres. For those who are acquainted with the Krupp guns, the tube¹ calls for no special remark. In place of the cylindro-prismatic wedge there is a flat wedge, with well-rounded edges. An innovation is introduced by cutting away the portion of the breech on the left side, in rear of the wedge slot, in order to facilitate the insertion of the fixed ammunition (powder charge and projectile combined in one metal case). The shank of the toothed tangent scale is worked by means of a spiral screw. This method has already been in use for some time with Krupp guns of heavy calibre, and is a great improvement, as it facilitates the adjustment of the sight, and thus accelerates the service of the gun.

The breech action is similar to that of the C/73 field gun. The action of turning the wedge-screw cocks a "striker;" on drawing out the wedge an "ejector" is brought into play, which throws out the empty case. The gun is fired, as a rule, by means of a lanyard provided with a hook, which latter hooks into the trigger piece; the lanyard passes through a "guide-loop," and, when pulled, fires the gun. The gun can also be made to fire automatically, if required, on closing the breech. A special safety arrangement makes the discharge impossible so long as the breech has not been completely closed. The bore has 24 parallel grooves of 1 mm. (0·3937 in.) in depth. The rifling has an increasing twist, the final twist amounting to one turn in 25 calibres, or about 7°. The guns are 1·8 m.

¹ The tube is of crucible steel (Tiegelstahl).

(70·87 in.) and 2·3 m. (90·55 in.) long, their respective weights being 215 kilos. (4 cwt. 0 qr. 26 lbs.) and 300 kilos. (5 cwt. 3 qrs. 17 lbs.).

The gun carriage differs from the ordinary field gun carriage in this respect, that the gun does not rest actually in the brackets, but in a top carriage which revolves on a pivot placed in front of the axle. A mechanism for giving lateral deflection revolves the upper carriage round this pivot, and gives the more delicate laying of the gun for direction. Rough laying is carried out as before, by means of the traversing lever. An "empty cartridge guard" protects the gunner, when using the traversing gear, from being damaged by the ejected empty cartridge cases. To lessen the recoil there is a powerful automatic break (two different patterns¹ of which have been experimented with), and, in addition, a "ploughshare" or spur placed under the point of the trail. To prevent, as far as possible, the point of the trail from burrowing into the ground, a steel angle-iron has been fixed on either side, by which means the bearing surface is increased.

The carriages weigh only 420 kilos. (8 cwt. 1 qr. 2 lbs.) and 540 kilos. (10 cwt. 2 qrs. 14 lbs.) respectively; the gun and carriage, when unlimbered, weigh 643 kilos. (12 cwt. 2 qrs. 18 lbs.) and 848 kilos. (16 cwt. 2 qrs. 22 lbs.), as against 955 kilos. (18 cwt. 3 qrs. 5 lbs.), which is the weight of the unlimbered German field gun and carriage (without its axle-seats, with which latter the 6-cm. gun carriage is not provided). The diminution in weight is obtained by lowering the axis of the gun to a height of 1·05 m.² (3 ft. 5·34 in.), as against 1·15 m. (3 ft. 9·28 in.) in the German field gun, by lessening the width of the wheel track to 1·48 m. (4 ft. 10·27 in.), as against 1·53 m. (5 ft. 0·24 in.), and by having smaller wheels of 1·20 m. (3 ft. 11·25 in.), as against 1·40 m. (4 ft. 7·12 in.).

The guns fire common shell, shrapnel and case, each weighing 3 kilos. (6 lbs. 10 oz.). The common shell has only one copper ring for taking the grooves. The bursting charge for the common shell is 60 gm. (2·1164 oz.). The shrapnel contains 100 bullets of 11 gm. (0·388 oz.) and a charge at the base of 30 gm. (1·0582 oz.). The time portion of the "time and percussion" fuze burns for 11 secs. The powder charges, of 195 gm. (6·88 oz.) and 285 gm. (10 oz.), respectively, of the C/89 smokeless powder in cubes of 1 mm. (0·04 in.), are contained in silk bags, and placed in cartridge cases, weighing respectively 1·05 kilos. (2 lbs. 5 oz.) and 1·16 kilos. (2 lbs. 8·9 oz.). The complete rounds (fixed ammunition) weigh 4·245 kilos. (9 lbs. 5·76 oz.) and 4·455 kilos. (9 lbs. 13 oz.) respectively.

The limber carries 48 rounds.³ These are packed on their sides in eight boxes, each holding six rounds. The boxes can easily be removed from the limbers. The empty limbers weigh 504 kilos. (9 cwt. 3 qrs. 19 lbs.), and when filled, 751 kilos. (14 cwt. 3 qrs. 3 lbs.), and 761 kilos. (14 cwt. 3 qrs. 26 lbs.) respectively. It is remarkable how little the ammunition weighs, relatively speaking, being only 173 kilos.

¹ The "Kammbremse" and the "Scheibenbremse."

² The extreme elevation is 20°; extreme depression 5°.

³ The field gun limber at present carries only thirty rounds.

(3 cwt. 1 qr. 17 lbs.), or 23 per cent. of the weight of the filled limber. With the C/73—88 field gun the ammunition weighs 260 kilos. (5 cwt. 0 qr. 13 lbs.), or 29 per cent. of the filled limber. The complete guns, with carriage and limber,¹ weigh 1,394 kilos. (27 cwt. 1 qr. 21 lbs.) and 1,609 kilos. (31 cwt. 2 qrs. 19 lbs.) respectively, as against 1,850 kilos. (36 cwt. 1 qr. 18 lbs.) in the case of the German horse artillery gun.

The initial velocities are, respectively, 420 m. (1,378 ft.) and 500 m. (1,640 ft.) per second; that is to say, that the 6-cm. L/30 gun has the same initial velocity as that of the heavy C/82 shrapnel shell. They could, however, without unduly straining the guns, be increased to 504 m. (1,654 ft.) and 638 m. (2,093 ft.); the recoil would, however, be so much greater, that it would considerably interfere with the rapidity of fire. The work done by the gun is, with the 6-cm. L/30 gun, 27 m.t.; that is to say, 125.5 m.-kilos. per kilo. of the gun, 42 m.-kilos. per kilo. of the unlimbered gun, or 19 m.-kilos. per kilo. of the weight behind the teams; with the 6-cm. L/38 gun, the work done amounts to 38 m.t.; that is to say, to 127.9 m.-kilos. per kilo. of the weight of the gun alone, 45 m.-kilos. per kilo. of the unlimbered gun, and 23.9 m.-kilos. per kilo. of the weight behind the teams.

The pressure on the cross section of the projectile, which is 3.3 calibres in length, is 106 gm. on the square centimetre, which is, consequently, only 9 gm., or 8 per cent. behind that of the heavy ring-shell C/82; but, on the other hand, is 27 gm., or 20 per cent. behind that of the heavy shrapnel C/82. If, nevertheless, the 6-cm. shrapnel of the 30-calibre gun has identically the same trajectory, as will be seen on reference to the range table, this must be ascribed to the better shape of the projectile. The shrapnel shell should be effective up to 3,000 m. (3,280 yds.).

The accuracy is somewhat less than that of the German heavy field gun, though up to 2,800 m. (3,000 yds.) the difference is inconsiderable. In rapid firing the gun has to be re-laid, although after the second round there is no more recoil;² no considerable amount of falling off in accuracy on this account was, however, noticeable, but this must be, in a great measure, ascribed to the excellent manner in which Krupp's personnel are trained.

With regard to the fire effect of these guns, the results obtained with the ring shell are of but secondary importance, since shrapnel is, and will always remain, the most effective form of projectile. We shall, therefore, confine ourselves to the results obtained with the last-named. Strangely enough, no reports are given as to trials with shrapnel with the L/38 gun; all the information applies to the 6-cm. Q.F. L/30 gun. The targets, for all the trials, consisted of three rows of boarded partitions, 2.7 m. (8 ft. 10 in.) in height, and 30 m. (33 yds.) in length, placed 20 m. (22 yds.) apart. Table I shows the results obtained.

¹ Weight behind the teams.

² At the first round the gun recoiled from 10 to 20 cm. (4" to 8"), according to charge used.

TABLE I.

Number in the series.	Range in yards.	Number of rounds.	Time in seconds.	Number of hits.				Distance of the point of burst from the target.		
					Per round.	Per minute.	Per kilo. of weight of projectile.	Mean.	Least.	Greatest.
1.	1,093	10	52	1st partition.....	56.1	648	18.7	-58	-30	-110
				2nd "	35.3	407	11.8			
				3rd "	22.4	258	7.5			
				Total	113.8	1,313	37.9			
2.	1,717	10	64	1st partition.....	35.2	330	11.7	-36	+5	-80
				2nd "	28.8	270	9.6			
				3rd "	22.5	210	7.5			
				Total	86.5	810	28.8			
3.	2,187	10	80	1st partition.....	22.5	168.8	7.5	-7.4	+20	-80
				2nd "	62.1	456.8	20.7			
				3rd "	34.9	261.8	11.6			
				Total	119.5	896.4	39.8			
4.	2,187	10	35	1st partition.....	41.5	701.6	13.8	-31	-10	-60
				2nd "	38.2	655.2	12.7			
				3rd "	21.8	373.2	7.3			
				Total	101.5	1,730.0	33.8			
5.	2,187	11	120	1st partition.....	17.3	86.5	5.2	-38	+20	-100
				2nd "	27.9	139.5	8.5			
				3rd "	21.9	109.5	6.6			
				Total	67.1	335.5	20.3			

TABLE II.

Number in the series.	Gun.	Range in yards.	Number of rounds.	Number of hits.			Distance of the point of burst from the target.		
					Per round.	Per kilo. of weight of projectile.	Mean.	Least.	Greatest.
1.	8-cm. gun L/29	2,187	12	1st partition..	83.8	11.9	-27	+45	-95
				2nd " ..	825	9.8			
				3rd " ..	780	9.3			
				Total..	2,611	31.1			
2.	8-cm. gun L/29	2,187	10	1st partition..	84.4	12.0	-35	+35	-80
				2nd " ..	664	9.5			
				3rd " ..	687	9.8			
				Total..	2,195	31.3			
3.	8-cm. gun L/26	1,093	13	1st partition..	99.1	14.2	-37	-10	-65
				2nd " ..	1,288	12.0			
				3rd " ..	895	9.8			
				Total..	3,277	36.0			
4.	8-cm. gun L/26	2,187	—	1st partition..	36.8	5.2			
				2nd " ..	82.9	11.8			
				3rd " ..	77.8	11.1			
				Total..	197.5	28.2			

In Nos. 1 and 4 of the series, the fuzes were fixed during the firing. The firing in No. 5 of the series was carried out with shrapnels filled with only 80 bullets weighing 11 gm. (0·388 oz.); the ground was covered with snow to a depth of 1 ft., and the surface was first thawed by the sun, and then allowed to freeze again.

Such figures give but a very imperfect indication of the value of a gun; the actual facts will only be arrived at by comparison. The report accordingly meets the difficulty by giving the results of experiments with 8-cm. (3·149-in.) guns of 26 and 29 calibres, "two guns well known for their excellent performances," the principal items of which are given in Table II.

The report then compares the performances of the two calibres, and, by leaving out of consideration No. 5 of the series with the 6-cm. gun, and allowing for the 8-cm. gun a rate of fire of two rounds per minute,¹ arrives at the following results:—

Range in yards.		6-cm. Q.F. L/30 gun.	8-cm. L/26 gun.	8-cm. L/29 gun.
1,093	Hits per round	113·8	252·2	—
	Hits per kilo. of weight of projectile	37·9	36·0	—
	Hits per minute.....	1,313	504·4	—
2,187	Hits per round	110·5	197·5	213·5
	Hits per kilo. of weight of projectile	36·8	28·2	31·2
	Hits per minute.....	1,313·2	394·0	437·0

The report consequently comes to the conclusion that the value of the fire effect of the 6-cm. Q.F. gun is to that of the 8-cm. gun as 1 : 2 as regards each round, and as 3 : 1 as regards number of hits per minute.

"The lasting power (*Haltbarkeit*) of the gun, as regards its several parts, has, in all respects, given satisfaction, and the breech action, the laying apparatus, &c., work irreproachably. . . . In order to be able, on occasions, to have a *rapid fire* with shrapnel, it is necessary to have a detachment of five gunners, of whom three are at the gun itself, working the breech, laying, firing, and loading, while the other two attend to the supply of ammunition and the fixing of the fuzes."

There can be no question but that the 6-cm. C/30 Q.F. gun is of excellent construction, and, at these trials, beat the 8-cm. gun, for even the fire effect by weight of ammunition is greater with the former gun than with the latter. This result is very remarkable, and stands out in most marked contrast with the description of the results of a long series of experiments, as given in the essay which appeared in

¹ The German Field Artillery Exercise, 1892, says that a battery of six guns can, for a few minutes, keep up a rapid fire of up to ten rounds per minute. Krupp's allowance is therefore ample.—*Note by Translator.*

our pages under the title, "A contribution towards the study of the field-gun of the future, with special reference to Q.F. guns." If, then, no exception can be taken to the above results, the necessary inference is an unqualified condemnation of the field-guns of the present calibre, and of the field-gun of the future as proposed by us.

The advocates of Q.F. guns of small calibre (Langlois) maintain that better results are obtained with these guns, both as regards the relation between the weight of metal thrown to the weight of the gun, and as regards the time test, than with those of the calibre at present in use. It is therefore well worth our while to examine whether, in the trials under consideration, the quatum of approval and disapproval has been fairly distributed with reference to the two guns whose performances form the subject of comparison: and whether, consequently, the conclusion arrived at in this case is worthy of more general application. We desire to test this question quite impartially, for upon its correct solution will depend much, if not all, of the future development of field artillery.

The fire effect of a gun, when firing shrapnel, depends upon the fire effect of each particular round, upon the degree of accuracy obtained, and upon the rate of fire that is maintained. The fire effect of each particular round depends upon—

- a. The number of the bullets;
- b. The penetration of the latter;
- c. The curve of the trajectory (angle of descent);
- d. The distance of the point of burst from the target;
- e. The size of the cone of dispersion.

a. The charge in bullets in these experiments consisted of 100 bullets, weighing 11 gm. (0.388 oz.). No information is given in the report with regard to the 8-cm. gun; we can, however, assume that both gun and shells were the same as those used at some experiments carried out at Krupp's works on 3rd October, 1890 (see Report LXXXIII), in the presence of the representatives of the artillery of several States. The 8-cm. L/26 gun fired, at that time, steel shrapnel weighing 7 kilos. (15 lbs. 7 oz.), loaded with a charge of 205 bullets of 13 gm. (0.4586 oz.) weight, and with a bursting charge of 130 gm. (4.586 oz.). In the case of the shrapnel for the 6-cm. gun, the bullet charge was 37 per cent. of the whole weight, while with that of the 8-cm. gun it was 38 per cent. Instead of the 205 bullets of 13 gm., there should be, in order to make the comparison a fair one, 242 bullets of 11 gm., or, in other words, 18 per cent. more. The bursting charge of the 6-cm. shrapnel of 3 kilos. weighs only 30 gm. (1.053 oz.), whilst that of the 8-cm. shrapnel of 7 kilos. weighs 130 gm. (4.586 oz.). Were the conditions precisely similar, the weight should be only 70 kilos. (2.47 oz.). It follows from this that, in place of 205 bullets, weighing 13 gm., the 8-cm. shrapnel should contain at least 248, weighing 11 gm. This means a difference of 21 per cent., which, of course, must be reckoned upon in estimating the fire effect. If we increase the fire effect of the 8-cm. shrapnel 21 per cent., we find that its relation to each kilo. of the weight of

the gun is at least equal to that of the 6-cm. shrapnel. It is raised, in the case of the 8-cm. L/26 gun, at a range of 1,000 m. (1,093 yds.) from 36 hits per kilo. of the weight of the gun to 43·5, and at 2,000 m. (2,187 yds.) from 28·2 to 34·1; in the case of the 8-cm. L/29 gun at 2,000 m. (2,187 yds.) it is raised from 31·2 to 37·7.¹ We cannot here enter into the question as to whether it will be possible, in the case of the 8-cm. shrapnel, to increase the charge in bullets by lessening the thickness of the walls of the shell, as has been so successfully done in the case of the 6-cm. shrapnel. The number of bullets might, by so doing, be increased from 80 to 100.

b. The penetration of the bullets depends upon their weight and their velocity. Since, in the case of a proper method of construction of a projectile, the weight of the bullets would be the same in both projectiles, the principal consideration will be the velocity of the shrapnel at the bursting point. That this is almost as great in the case of the 6-cm. shrapnel, in spite of its smaller pressure on the cross section, as in that of the heavy field shrapnel C/82, and is, consequently, quite sufficient, has already been explained. No further details are to hand as regards the 8-cm. shrapnel; we must, therefore, resort to conjecture. At the trials in October, 1890, referred to above, the 8-cm. L/26 gun was fired with a charge of 0·57 kilos. (1 lb. 4 oz.) of smokeless C/89 powder, which, judging from the reports from the firm on its trials with smokeless powder, must have imparted to the projectile of 7 kilos. (15 lbs. 7 oz.) weight an initial velocity of some 525 m. (1,722 ft.). We estimate the initial velocity of the projectile fired from the 8-cm. L/29 gun at 550 m. (1,804 ft.). If we assume that the 8-cm. and the 6-cm. projectiles are similar in form, and are equally acted upon by the resistance of the wind, we arrive at the following terminal velocities:—

M.	Yds.	6-cm. L/30.	8-cm. L/26.	8-cm. L/29.
At 1,000	(1,093)...	318	408	428
" 2,000	(2,187)...	269	317	332
" 3,000	(3,280)...	232	275	279

From this it follows that, other conditions being equal, the shrapnel bullet from the 8-cm. gun has a penetration at least 40 per cent. greater than that of the bullet from the 6-cm. gun. This fact was

¹ If we calculate the proportion of hits with reference to the weight of ammunition used (instead of projectile alone), we then find that the proportion of hits falls off more rapidly in the case of the 6-cm. Q.F. gun than in that of the 8-cm. gun. In the former the cartridge case is some 25 per cent. of the weight of the whole round, while in the latter it is only some 12 per cent. On the assumption that the 8-cm. shrapnel had been filled with 11-gm. bullets it would, *at every range, and at all the trials*, have proved itself superior to the 6-cm. shrapnel as regards effect with reference to the weight of rounds expended.

not apparent in the above experiments, since the distances of burst from the target were in each case very small. It may, however, be taken for granted that the shrapnel bullets from the 8-cm. gun would, with a distance of burst from the target greater by some 50 or 60 m., have just as much penetration as those of the 6-cm. gun.

c. The *trajectory* of the projectile and the *angle of descent* have only to be reckoned in the calculation when the distance of the point of burst, and its height, are not in proper proportion to each other, i.e., in the case of firing short of the object, or when the target has considerable depth. If the angle of descent is small, a deeper space will be covered, whilst, with a large angle of descent, the effect, in this direction, decreases very rapidly. The above trial was arranged in such a manner as to obtain the greatest possible number of hits; the mean trajectory was such as to strike about the second target. That, however, the 8-cm. gun is, in this respect, far superior to the 6-cm., will be seen from the following comparison.¹ The angles of descent are:—

M.	Yds.	6-cm.	8-cm. L/26.	8-cm. L/29.
At 1,000	(1,093)...	$2\frac{7}{16}^{\circ}$	$1\frac{7}{16}^{\circ}$	$1\frac{7}{16}^{\circ}$
„ 2,000	(2,187)...	$6\frac{7}{16}^{\circ}$	$4\frac{1}{16}^{\circ}$	$4\frac{1}{16}^{\circ}$
„ 3,000	(3,280)...	$12\frac{9}{16}^{\circ}$	$8\frac{9}{16}^{\circ}$	$8\frac{9}{16}^{\circ}$

If we had wished to arrive at an idea of the influence of the effect, as regards distance, upon the number of hits, it would have been necessary to have put up the partitions, not at intervals of 20 m. (22 yds.), but of at least 50 m. (55 yds.), or possibly even of 100 m. (110 yds.). In the above experiments the mean distances of the points of burst from the three partitions were about 30, 50, and 70 m.; had the partitions been placed at intervals of 50 m., we should have obtained distances of 30, 80, and 100 m.; and with intervals of 100 m., which would perhaps be still better, the distances would have been 30, 130, and 230 m. The value of a shrapnel shell lies specially in its effect as regards depth (*Tiefenwirkung*); this must, consequently, never be neglected in trials with shrapnel. There can be no doubt that, had the targets been placed at greater intervals, the superiority of the more extended trajectory of the 8-cm. gun would have been very apparent. This would have been the case to an even greater extent had the range been longer, say 3,000 m. (3,280 yds.).

Should it be desirable to do so, it can, even with these experiments, be shown how small was the effect, as regards depth, of the 6-cm. shrapnel, as compared with that of the 8-cm. Compare, for instance, the results given in column 8 of Table I, as to the hits in the second and third partitions, with the corresponding data in column 7 of Table II. The figures relating to the hits in the second partition are,

¹ Calculated for the 8-cm. gun.

in the case of the 6-cm. gun, throughout higher than the corresponding ones with regard to the 8-cm. gun; whilst the figures relating to the hits on the third partition are, with one single exception (No. 3 in the series, where the mean distance of the point of burst was very small), exactly the reverse.

d. The greater the *distance of the point of burst from the target*, the fewer will necessarily be the number of hits, so long as the point of burst always remains in front of the target. In this respect, the conditions in the experiments would appear to be almost the same. At 1,000 m. (1,093 yds.) the conditions were more favourable for the 8-cm., whilst at 2,000 m. (2,187 yds.) the conditions were more favourable for the 6-cm. gun. In the results given with regard to the 8-cm. gun L/26, under serial number 4 of Table II, no details are given as to the distances of the points of burst.

e. The *size of the cone of dispersion* has as much influence upon the effect of a round as the distance of the point of burst and the number of bullets. When dealing with the number of hits alone, as in the results given above, a shrapnel with a small cone of dispersion is, other conditions being equal, superior to one with a large cone of dispersion. No data are given as to the size of the cone of dispersion; there can, however, be no doubt that the cone of dispersion of the 6-cm. shrapnel is smaller, probably considerably so, than that of the 8-cm. shrapnel. We are concerned in each case with shrapnels having the charge in the base (*Bodenkammerschrapnels*), in which the cone of dispersion depends *principally* upon the relation of the velocity of rotation to that of progression. This relation is (since all the guns have the same angle of rifling, *i.e.*, 7°) greater in the case of the 8-cm. gun than in that of the 6-cm. The velocity of rotation of a projectile, which may be taken to be constant throughout the trajectory, is equal to the product of the initial velocity multiplied by the tangent of the angle of rifling, and is, for the 6-cm. gun, 51.6 m. (56.4 yds.); for the 8-cm. gun L/26, 64.4 m. (70 yds.); and for the 8-cm. gun L/29, 67.5 m. (74 yds.). The results arrived at, in this respect, are given in Table III.

There is another reason why the cone of dispersion is smaller in the case of the 6-cm. shrapnel than in that of the 8-cm. The smaller the distance of the outside shrapnel bullets (those which lie close to the outside wall of the shell), in proportion to the exterior diameter of the projectile, the smaller will be the cone of dispersion.

The *relatively smaller effect of the 8-cm. shrapnel* is to be explained, leaving out of account the relatively smaller number of bullets, *solely and entirely by the difference in the number of bullets.*

The question arises, then, whether the larger cone of dispersion of the 8-cm. shrapnel is absolutely necessary, or whether, by a suitable construction, it may not be made smaller. From our point of view the angle of rifling of 7° for the 8-cm. gun, the projectiles of which have relatively the same length as those of the 6-cm. gun, but a far greater velocity, is *too great*. If an angle of rifling of 7° is suitable for an initial velocity of 420 m. (1,378 ft.), then, for an initial velocity of 525 m. (1,722 ft.) or of 550 m. (1,804 ft.), an angle of rifling of

TABLE III.

	Velocity of rotation in metres.	At muzzle.		At 1,000 m. (1,093 yds.).		At 2,000 m. (2,187 yds.).		At 3,000 m. (3,280 yds.).	
		Muzzle velocity in metres.	Ratio of velocity of rotation to that of progression.	Muzzle velocity in metres.	Ratio of velocity of rotation to that of progression.	Muzzle velocity in metres.	Ratio of velocity of rotation to that of progression.	Muzzle velocity in metres.	Ratio of velocity of rotation to that of progression.
6-cm. gun.....	51.6 (169 ft.)	420 (1,378 ft.)	0.123	318 (1,043 ft.)	0.163	269 (883 ft.)	0.192	232 (761 ft.)	0.222
8-cm. gun L/26....	64.4 (211 ft.)	525 (1,722 ft.)	0.123	403 (1,339 ft.)	0.158	317 (1,040 ft.)	0.203	275 (902 ft.)	0.234
" " L/29....	67.5 (221 ft.)	550 (1,804 ft.)	0.123	423 (1,404 ft.)	0.156	332 (1,089 ft.)	0.203	279 (915 ft.)	0.242

$5\frac{1}{3}^{\circ}$ would be quite sufficient, since it gives the projectile precisely the same velocity of rotation as an angle of rifling of 7° gives with 420 m. Formerly it was laid down as a maxim, that the rifling must have sufficient twist to give the greatest possible degree of accuracy; and even if the twist were greater than this it did not matter. This is quite true so long as one is only dealing with ring shell; it will, however, be seen from the above considerations that too great a twist may act disadvantageously with regard to the effect of shrapnel. With an angle of rifling of $5\frac{1}{3}^{\circ}$ the proportion of the velocity of rotation to the velocity of progression would be as follows:—In the case of the 8-cm. L/26 gun

at	0 m.	(	0 yds.)	0.096.
"	1,000 "	(	1,093 "	) 0.126.
"	2,000 "	(	2,187 "	) 0.163.
"	3,000 "	(	3,280 "	) 0.187.

The difference is, then, very considerable; according to our estimate, the diminution of the cone of dispersion would, at 2,000 m., increase the number of hits by some 25 per cent., and at 3,000 m. perhaps by about 30 per cent.

A diminution of the cone of dispersion, so long as it is only a question of the number of hits, has always a favourable influence on the results of the trials; this was evident in the case of the above experiments. Whether it would also be advisable under actual service conditions is quite another question. The number of hits may be too great in proportion to the number of ranks struck. Under certain circumstances, a great dispersion of the bullets may also be desirable, even if, by so doing, the number of hits should be less. In the modern artillery fight, for instance, the position of individual guns often cannot be recognized, and, consequently, *accurate* laying, as regards direction, is quite impossible. With a very small cone of dispersion the danger arises that, even if the range is accurately calculated, the whole dangerous zone may, owing to defective laying as regards direction, lie in the interval between two guns, and thus lose all effect. It follows from this that the cone of dispersion will be the most favourable when the zone of danger at the actual fighting ranges (2,000 to 3,000 m.) has, with a normal distance of burst from the target of 50 m., a width of some 16 m. (the interval between guns). This would correspond with a cone of dispersion of 18° . On the other hand, it is desirable that the density of the hits should be so great that, with a normal distance of burst, at least one bullet should strike the superficial area of a man—some 0.80 sq. m. [1.7 m. (5 ft. 7 in.) high by 0.46 m. (18 in.) wide].

On taking a portion of the zone of danger, 16 m. in diameter, the contents of the cross section have a superficial area of 201 sq. m.; to meet the above requirements, then, the shrapnel would have had to contain 210 bullets, which, with a weight of 11 gm. per bullet, would give it a weight of 2.76 kilos. (6 lbs. 1 oz.). A cone of dis-

persion of 18° can only be obtained, when using a shrapnel with charge in the base, at a range of 2,500 m.¹ (2,734 yds.).

With the best projectiles that we know of, of this nature, the weight of the charge amounts to some 38 per cent. of the total weight; this would give a shrapnel of 7.26 kilos. (16 lbs.). Should it be possible to so construct the projectile that the bullet charge should be increased to 40 per cent. of the total weight, then the latter might be reduced to 7 kilos. (15 lbs. 7 oz.).

We cannot, of course, here deal with accurate mathematical figures; it will, however, be advantageous to explain what would be the consequences of continuing to diminish both the weight of the projectile and the cone of dispersion.

The *accuracy of a gun* when firing shrapnel depends upon the dispersion of the bullets as regards length, height, and width, as well as upon the manner in which the fuzes behave. The dispersion of the bullets, in the case of the 8-cm. gun, is small; in spite of the flat trajectory, the dispersion, as regards length, is even less than with the 6-cm. gun. On the other hand, the dispersion of a shrapnel of the 8-cm. gun at the point of burst was very great, and, at 2,000 m., even considerably greater than with the 6-cm. gun. This result may be ascribed in part—only, however, in part—to the greater terminal velocity. At 2,000 m., for instance, the terminal velocity of the 8-cm. shrapnel is 332 m. (1,090 ft.) as against 269 m. (883 ft.) in the case of the 6-cm. gun. If, in both cases, the shrapnel fuzes were to burn 0.1 second too long or too short, there would, in consequence, be an error in the point of burst of 33 m. (36 yds.) in the case of the 8-cm. shrapnel, and of 27 m. (29.5 yds.) in the case of the 6-cm. The difference is trifling; technicalists must, however, in any case endeavour to perfect, as far as possible, the fuzes for projectiles of great velocity. In general, it will, however, be easier to produce a good fuze for the 8-cm. shrapnel than for the 6-cm. With the latter the required time of burning can only be obtained by using a more slow-burning composition, and such compositions, as a rule, burn more unevenly than the quicker-burning natures. The greater dispersion at the points of burst of the 8-cm. shrapnel cannot, therefore, be regarded as an *unavoidable* error in guns of high velocity, but rather as an *accidental* error.

Finally, as regards the *rapidity of fire* there is no doubt that an increase in this respect *may* make up for the lesser effect of a single round, though this is not *necessarily* the case. In these ex-

¹ We consider a shrapnel with charge in the base, although its bursting charge is not so heavy as that of the ring-shell, to be very suitable for ranging. Since the universal introduction of smokeless powder, the bursting charge has had to be somewhat diminished. In spite of this, however, the somewhat smaller burst-cloud will be readily recognised and observed. The cone of dispersion at the muzzle must, in the case of an 8-cm. shrapnel weighing 7 kilos, and having an initial velocity of 525 (1,722 ft.) to 550 m. (1,804 ft.), be some 10° , in order that at a range of 2,500 m. (2,734 yds.)—the velocity of the projectile being some 300 m. (984 ft.)—it may be 18° . The measurement of the cone of dispersion at the muzzle presents no difficulty whatever; no method has, however, yet been discovered for obtaining an *accurate* measurement at any other distance.

periments the rapidity of fire was very great; in the comparison made it reached at a range of 2,000 m., on the average, from 11 to 12 rounds per minute (see Table III). In one case (see Table I, serial number 4) 10 rounds were fired in 35 seconds; this may be termed a parade achievement, which may be obtained by selecting special men for the gun detachment, but which, however, should not be included in any serious calculation. With such results one cannot help one's thoughts straying to the achievements of professional marksmen, such, for instance, as Mr. Carver. If one considers the whole of the experiments—which, without exception, were carried out against targets which were remarkably conspicuous, so that there was no loss of time in laying—we find that the rapidity of fire *when rapid firing*, amounted to from 7 to 8 rounds per minute. In the case of the 8-cm. gun the rapidity of fire was only taken at 2 rounds per minute. As a matter of fact, a rapidity of fire of 12 rounds per minute *in a battery* of 6 guns has been reached in the case of the French 9-mm. gun, which, on account of the great weight of its projectile, has a very great recoil and is itself very heavy. The rapidity of fire of the 6-cm. gun can therefore be reckoned *at the highest* at three times as great as that of the 8-cm. gun, since a *single* gun always fires quicker than when it has to fire in a battery with several others. In order that the fire effect of the 8-cm. gun may be equal to that of the 6-cm. Q.F. gun, it is only necessary to value the projectile of the former at some 30 per cent.—calculated on the weight as unity—higher than that of the latter. The report states that at the experiments carried out at Scheveningen and Oldebroek, the gun was served by Dutch gunners, who had only had a short instruction on one previous occasion. The rapidity of fire amounted in this case, on the average, to from 7 to 8 rounds (in one series it attained to as much as 15 rounds). One of the experiments carried out here allows of a comparison between the fire effect in the case of ordinary and of rapid fire; the fire effect in the latter case was, at a range of 1,200 m. (1,312 yds.), at a large and deep target, 30 per cent. less than in the case of ordinary fire. This loss was precisely the same as that estimated by us in our essay, “A contribution, &c.”

The delivery of a continued rapid fire can, then, only be of value if a greater depth of space is brought under fire by dispersion. So soon as more than three or four rounds are fired from one gun per minute, neither the elevation nor the length of the fuze can be altered. All that can be done is to fire each of the guns with a different elevation and with a different length of fuze. It is precisely in this nature of fire that a great fire effect as regards depth (which, however, presupposes flat trajectories and a small angle of descent) is specially desirable. This is, however, wanting in the case of the 6-cm. gun. By advancing and retiring in *échelon* when firing *shrapnel*, as prescribed in the German Firing Regulations, by which we, in the same way, bring a greater depth under fire, we at the same time, it is true, give up, to a certain extent, a large portion of the fire effect; by so doing, however, we are enabled to continue to

observe the shots, and we are thus enabled to diminish the extent of space to be brought under fire and, consequently, to increase the fire effect.

It must also be remarked that, in all cases in which the elevation must be given with the clinometer, whether in firing at a concealed object or from under cover, the rapidity of fire will be lessened to such an extent that the Q.F. gun cannot fire at an appreciably greater rate than an ordinary gun. Only when the weight of the projectile can be diminished to such an extent that after-laying can be entirely dispensed with, would it be possible, in this case, for a really rapid fire to be a matter for consideration.

By the foregoing considerations we believe that we have demonstrated that the results of the Krupp trials with the 6-cm. Q.F. gun are in no wise in a position to shake the opinions given in Nos. 49 and 50 of the "Militär-Wochenblatt" of last year as to the doubtful value of small calibre Q.F. guns. The report is, nevertheless, very valuable in connection with the development of the gun of the future, since a very great deal may be learned from it. For instance, it appears that it will be possible to construct, without increasing the weight of the projectile, and without diminishing the bursting charge (which would be valuable for experiments, but not under actual service conditions), an 8-cm. shell with a larger number of bullets, by lessening the thickness of the walls, as has been successfully done in the case of the 6-cm. shrapnel. It will further appear necessary, in the case of the gun of the future, not to make the rifling depend upon the accuracy alone, but also upon the fire effect of the shrapnel shell. This can only be elucidated by undertaking experiments in which the *fire effect of individual rounds shall be recorded*. Such trials as these, undertaken with partitions at great distances, in order to arrive at the fire effect as regards depth, are certainly required in order to arrive at satisfactory results.

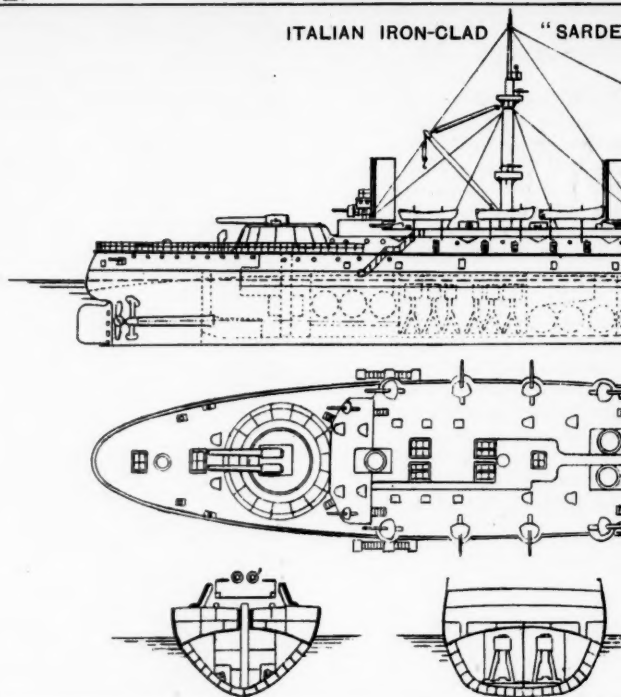
Of the arrangements for increasing the rapidity of fire, the metal cartridge, though separated from the projectile, may, perhaps, merit attention. We consider that the tangent scale with toothed shank thoroughly meets the requirements of the case by providing a delicate motion in laying for elevation. It is really astonishing that the necessity for this has not long since been discovered, since for deflection, which is much less seldom altered, a delicate motion has been in use for the last thirty years. If we give the shank of the tangent scale an inclined position with regard to the plane of sight, corresponding with the deflection laid down in the range tables, we shall, by so doing, lessen the time required for fixing the tangent scale to a yet greater extent, which will again considerably increase the rapidity of ranging.

The separation of the gun carriage into the top and bottom portions, which allows of the introduction of an arrangement for the more delicate laying as regards direction, naturally facilitates the whole operation, and consequently accelerates the rate of fire. Undoubtedly, however, this advantage must be purchased at the expense of either an increased weight of the unlimbered gun or else

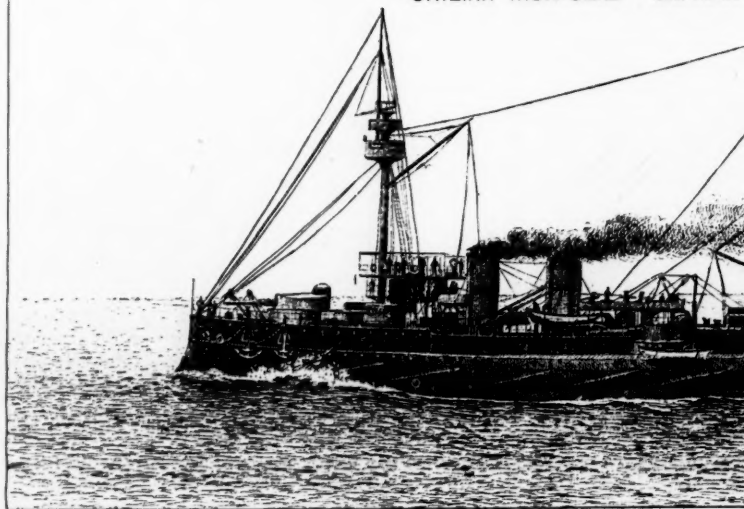
a considerable diminution in the fire effect—i.e., weight of projectile and velocity—and exhaustive trials will be required to show whether this advantage is equal to the sacrifice involved. Moreover, we very much doubt whether, either in the case of the employment of shrapnel fire, or of the difficulty of making out targets in the event of a modern engagement, *accurate* laying for direction is either necessary or possible. We have already dispensed with accurate laying for direction by setting up the lining picket, which was formerly placed from 50 to 100 m. behind the guns, at a distance of 8 m. Again, the mistakes involved by not bringing the gun up accurately into position are, constantly, from 6 to 12 times as great now as they were before, and the deflection of the projectile is proportionately increased. If the position of the gun is altered by 1 cm. this produces a deflection of the projectile of 3 m. (10 ft.) at a range of 2,400 m. (2,624 yds.), which corresponds to a deflection of more than one graduation of the deflection-leaf. If such mistakes in laying for direction are not to be taken into the reckoning, then laying with the traversing lever will not certainly require much time. It can even be done quite easily by gunner No. 3 alone when running up the gun.

(100.)

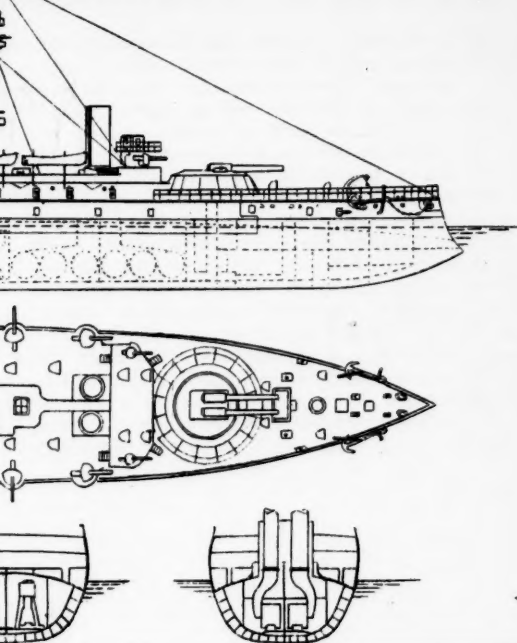
ITALIAN IRON-CLAD "SARDE"



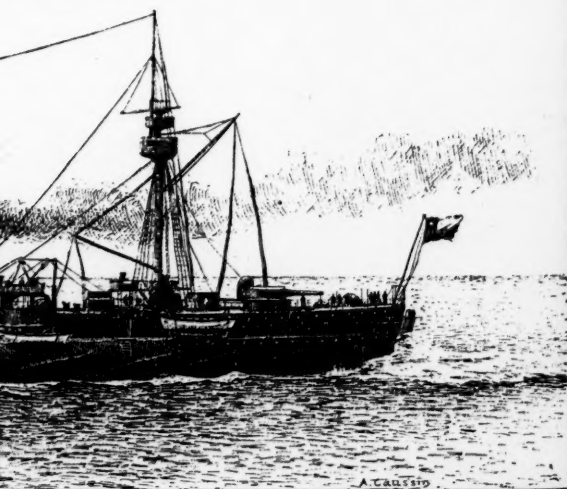
CHILIAN IRON-CLAD "CAPITAN"

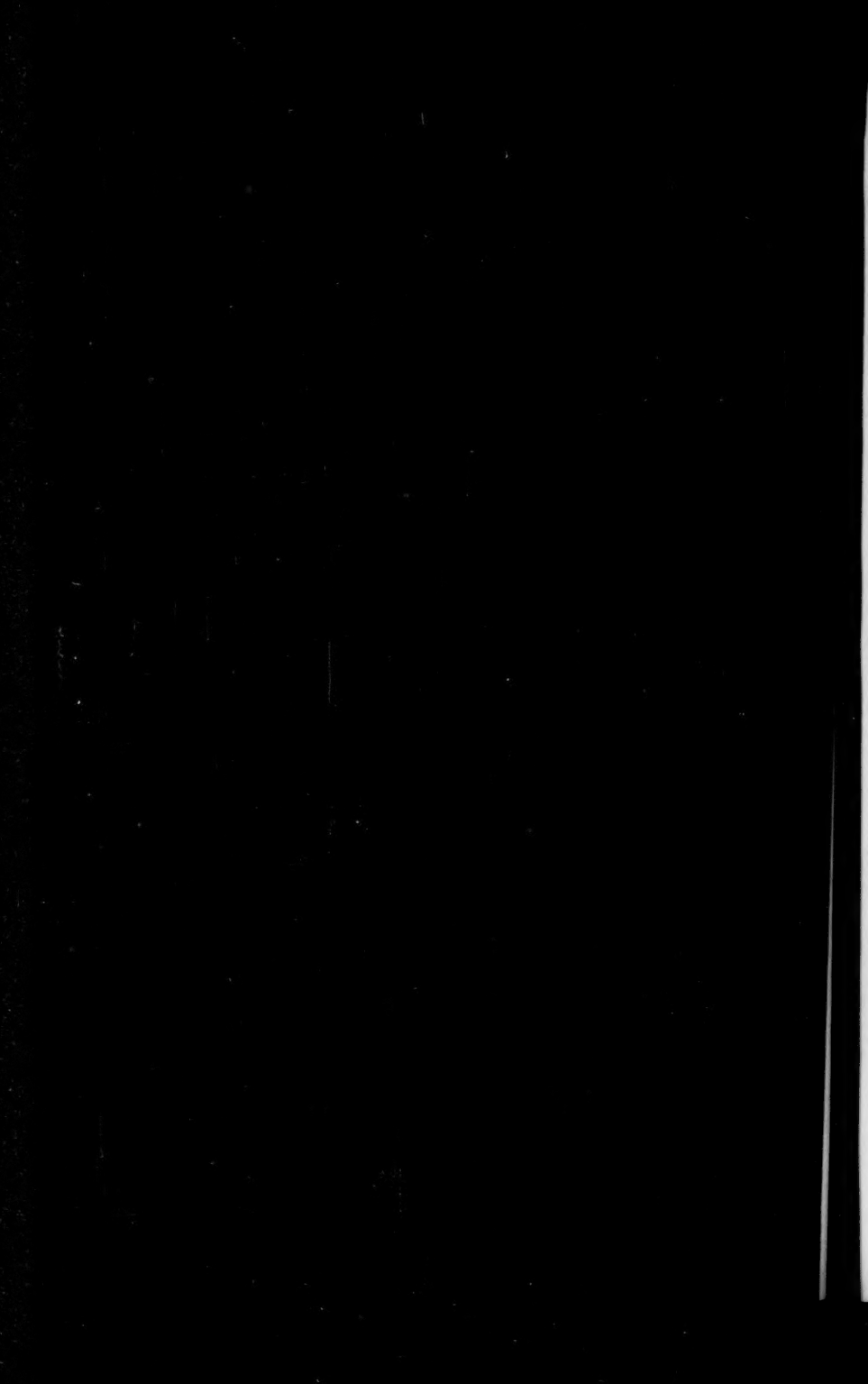


"SARDEGNA."



"CAPITAN PRAT."





NAVAL AND MILITARY NOTES.

NAVAL.

Home.—The "Howe" was successfully docked at Ferrol on the afternoon of the 17th ult., without any hitch or stoppage; the docking was carried out by the men of the squadron, under the immediate direction of Rear-Admiral Seymour and his Staff. The "Howe," with three of her boilers going, worked her own pumps. The barbette guns were not hoisted out. From the examination of her bottom, the ship does not appear to be so badly strained as was anticipated would be the case after having rested five months on her midships section with her stem and stern unsupported. It has been decided that the provisional repairs are to be carried out by Spanish operatives, under the joint superintendence of the Spanish Chief Naval Constructor, at Ferrol, and Mr. Logan, from the Constructor's Department of the Admiralty.

The 1st Class battle-ship "Hood" and the 3rd Class battle-ship "Rupert" have been transferred to the A division of the Fleet Reserve as ready for service. One of the greatest improvements in the refit of the "Rupert" has been the removal of her foremast, which interfered with the fire of her turret guns.

The "Achilles" is taking out a new crew for the 1st Class battle-ship "Trafalgar," which ship is to be recommissioned at Malta for another term of service in the Mediterranean.

The 3rd Class cruiser "Barham," which is to be commissioned on the 2nd inst., to relieve the "Landrail" in the Mediterranean, has at last completed her trials, with a fair measure of success. She first went out for an eight hours' run to test the ferrules fitted to her boiler-tubes, and the new set of fan engines fitted to her since her last unsuccessful trial. The new fan engines worked satisfactorily, and no breakdown was reported, but the main engines developed only 3,590 I.H.P., giving the vessel a speed of 18.9 knots. The air pressure employed was 1.3 in., steam in boilers 131 lbs., and revolutions 180 per minute. On the 15th she was again taken out, and the results were far more satisfactory than on any previous occasion. Under 2.1 in. of air pressure the boilers were forced to an average of 137 lbs. of steam, and the engines developed 4,538 I.H.P.—nearly 1,000 H.P. more than before. There was also a satisfactory increase of speed, as she seems to have made 20.8 knots by the patent log. On the whole, the trials have been considered satisfactory, but there is no hope that her engines will ever develop anything approaching the 6,000 H.P. for which they were originally designed. Her present success is undoubtedly due to the Admiralty ferrule, the credit for which, according to Mr. Durston, Engineer-in-Chief of the Navy, belongs to Mr. E. Peck, of Messrs. Yarrow's firm, at Poplar, and to Mr. Oram, Staff Engineer, R.N., at present doing duty at the Admiralty. The original idea was Mr. Peck's, but certain most important improvements are Mr. Oram's work. There can be no question but that the country has been saved thousands of pounds by the adoption and success of the new boiler ferrule. The necessity for ordering new boilers at enormous cost for the "Thunderer," "Vulcan," and "Devastation" has now happily been averted, and a like fate has been averted in the case of most of the 70 ships built under the Naval Defence Act of 1889. The ferrule consists of a short bell-mouthed tube, inserted

into the orifices of the boiler tubes, and so designed as to carry the heat past the tube joints to a part of the surface capable of absorbing it without injurious overheating of the metal, while it also partially protects the tube plate from the impact of the flame.

The 2nd Class battle-ship "Thunderer" has been sent to Sheerness to take the place of the "Northampton," as flag- and guard-ship at that port. This is a great change for the better, as the "Northampton" is utterly useless alike for steaming or fighting, while the "Thunderer," with her new armament of B.L. guns and her new engines and boilers, is a very formidable ship. The 1st Class battle-ship "Benbow" is to be brought from Chatham to Sheerness, where she will serve for instruction purposes, as tender to the School of Gunnery, lately established at that port.

The 1st Class cruiser "Edgar" has proved herself so far to be a good and economical steamer. On her passage to Malta, she has easily averaged $14\frac{1}{2}$ knots an hour, only using two-fifths of the authorized draught power.

The new steamer "Campania," built by the Fairfield Company, of Glasgow, for the Cunard Line, is in many respects so notable a vessel that a short description of her, taken from the columns of the "Times," will not be out of place in these notes. The "Campania" is 620 ft. long by 65 ft. 3 in. broad and 43 ft. deep, with a displacement of 12,500 tons, twin screws, and engines working up to a total of 30,000 I.H.P. She is only 72 ft. shorter than the "Great Eastern," but her lines being finer and her depth far less, her gross tonnage is less than half that of Brunel's great ship. Some idea of her magnitude may be gained from the fact that her two enormous funnels, through which a mail coach could be driven as through a tunnel, stand higher from the keel than the height of the Eddystone Lighthouse. They are 19 ft. in diameter, and if the whole of the huge boilers in the vessel were put end to end, they could be all packed in one funnel. The crow's nest on the foremast, where the forward look-out is kept, is constructed at a height of 100 ft. from the sea level, and from this position a radius of 15 miles can be commanded, and the bridge from which the ship is navigated stands at a height of 60 ft. above the sea level. Eighteen water-tight bulkheads rise from the keel to the main deck, as does also the fore and aft bulkhead between the two sets of engines. All the water-tight doors in these bulkheads are closed from the upper deck; the bulkheads in the body of the ship are 65 ft. apart, and three of the compartments so formed are occupied by the boilers and by coal. Six boilers fill a compartment; and the middle one of these three compartments is entirely filled with coal, so as to separate one-half of the steam-producing arrangements from the other half. Thus, if two breaches were made in the side of the vessel 120 ft. apart, and the two compartments punctured were filled with water, the vessel would still float and be able to steam at a fair speed with both propellers working. The ship has a double bottom formed of a number of small compartments of unusual strength; the steel plates used in this part of the ship are 25 ft. by 6 ft.; every rivet hole has been drilled with special care, instead of being punched, and all the angle irons have been welded into a solid form, instead of being only riveted. There are 12 large double-ended boilers, 18 ft. in diameter and 17 ft. long; there are also two smaller boilers for auxiliary work: they work to a pressure of 165 lbs. to the square inch, have been tested to double that pressure, and have, all told, 102 furnaces, and they produce the pressure and speed required without any forced draught. The coal consumption is as low as $1\frac{1}{2}$ lbs. per H.P., as compared with 1.9 lbs. in the case of the "Umbria." This involves a supply of 2,900 tons of coal for the journey, and the bunkers have a capacity of 3,200. Of course, at slower speeds much less would be required. The arrangement of the coal bunkers has been controlled by the requirements of the Admiralty, and a good deal of the coal is placed along the side of the vessel, and also above the boilers, as a protection of the vital parts of the ship, in case she is used as an armed cruiser.

The engines of the "Campania" will be a subject of the greatest interest in marine engineering circles for some years to come. They are of a peculiar type,

first adopted in the Fairfield Yard in the construction of the North German Lloyd fleet, and designed to reduce the space into which engines of great power may be compressed. It was felt that the limit of the diameter of steam cylinders had been nearly reached; and if the old-fashioned plan of using three cylinders for triple expansion had been followed, it was seen that the low pressure cylinders, in a case of 15,000 H.P., would have been greater in diameter than existing machinery could produce with accuracy, or than space could be provided for in the vessels it was proposed to drive. The plan adopted, therefore, was to divide both the high-pressure and the low-pressure cylinders into two, to place a small high-pressure cylinder on the top of a low-pressure, and to put the piston in each case on the same piston-rod and work them tandem fashion. The intermediate cylinder stands alone in the middle of the series, and the piston-rods of each connect with one of the three cranks of the screw shaft. The diameter of the "Campania's" two high-pressure cylinders is 37 in. each; the diameter of the intermediate is 79 in., and of the two low pressures 98 in. The space occupied by these engines is not greater than that required by some of much less power, and it has been found possible to pack into the hull of the "Campania" two sets of engines, side by side, each of which is greater in power than the engines of the "Umbria," and at the same time to provide ample, and even large, space for access to every part of them. The pistons, piston-rods, and connecting rods of these engines weigh about 120 tons; they have a stroke of 69 in., and at 81 revolutions this enormous weight is moved a distance of nearly 1,000 ft. each minute.

The crank shaft is 26 in. in diameter, and each of the three interchangeable parts weighs 27 tons. These, with the thrust shaft, 14 ft. long, make up a total of 160 tons for each crank shaft. The propeller shaft is 24 in. in diameter, and is fitted in lengths of 24 ft., each length having two bearings; and the thrust-block is fitted with 14 rings. The propeller, which is placed on the end of the shaft without any exterior overhanging bracket, is three bladed, and each blade weighs 8 tons. A great novelty in this part of the machinery consists in the addition of what is described as an emergency governor. In the event of a fracture of the propeller shaft, or upon anything occurring which would result in the "racing" of the screw beyond, say, 130 revolutions per minute, the governor will act upon the reversing gear, place the eccentric links into mid gear, and thus stop the engines. This novelty has been designed to prevent such a catastrophe as that which occurred in the engine-room of the "Paris" three years ago.

The rudder, which is one large plate of steel, 22 ft. by 11 ft. 6 in. in area and 1½ in. thick, has already been a subject of public comment. It was rolled at Krupp's, in default of a British firm choosing to undertake the job. The chief attraction, however, connected with the rudder is the novel steam steering apparatus devised by Messrs. Brown. The whole of the chains and connecting rods associated with the steam steering engines of the past and the accompanying noises are done away with. The engine of the Brown machine travels bodily hither and thither in the same way as an ordinary tiller. It actually balances the rudder by its weight within the body of the ship, and thus reduces the wear of the bearings of the rudder. Motion is given to the steering engine by hydraulic communication acting from the bridge through pipes of about ½ in. in diameter. The apparatus is usually fixed on deck, but in the "Campania" it is below the water-line, in accordance with Admiralty requirements.

The result of her trials was to give a speed of something over 22½ knots an hour, and one run a speed of 23 knots, or 26½ statute miles, was nearly attained. The "Umbria," when tried on the mile in October, 1884, made 20.1 knots, so that the "Campania" may be taken to be at least 2½ knots faster.

Argentine Republic.—The ironclad "Independencia," having successfully concluded her gun and steam trials, has been formally handed over to the Argentine officers and crew sent to England to navigate her to South America, and has left for her destination. The 1st Class protected cruiser, "Nuevo de Julio," has also sailed from the Tyne, proceeding to New York to take part in the naval display there in honour of the Columbus celebration. A full description of this cruiser and also of the "Libertad," sister-ship to the "Independencia," was given in the March

"Notes"; the "Libertad" recently steamed to Buenos Ayres at an average speed of 10·5 knots an hour, burning but 21 tons of coal per diem.

Chili.—The armour-clad "Capitan Prat" (Plate 18), which has been constructed in the yard of the Société des Forges et Chantiers de la Méditerranée at La Seyne, near Toulon, having successfully undergone her gun and steam trials, has left for Valparaiso. Her dimensions are as follows:—

Length between perpendiculars.....	325 ft.
Beam.....	54 "
Mean draught.....	21 "
Displacement.....	6,901 tons.
Indicated horse-power F.D.....	12,000
Estimated speed.....	18 knots.

The ship is protected by a complete water-line belt of a maximum thickness of 12 in. of steel armour, which is carried up amidships to the level of the upper deck and forms an armoured redoubt 133 ft. long; there is also a 4-in. armoured deck, running the length of the ship on the top of the belt. Her armament consists of four 24-cm. (9·4") 36 calibre Canet guns on Canet mountings, mounted in 14-in. armoured barbette turrets, one firing ahead, another astern, and one in sponsons each side amidships; eight Canet Q.F. 12-cm. (4·7") 45 calibre guns mounted in pairs in closed 4-in. armoured turrets, two forward and two aft. The advantage of this arrangement is that, either when chasing or being chased, three of the 24-cm. guns and four of the 12-cm. guns can be brought into action. The auxiliary armament consists of four Hotchkiss 57 mm. Q.F. guns, four of 47 mm. (3-pr.) Q.F., and six of 37 mm. Q.F., and five mitrailleuses mounted in the tops; there are also four torpedo-tubes on the Canet system, one fixed forward, one aft, and one on each broadside on turntables. Special interest attached to the gun trials, because the guns, turrets, ammunition hoists, &c., can be worked either by electricity or by hand, although the hand-gear is only intended to be used in the event of a breakdown in the former; electricity taking the place of the complicated system of pipes required for hydraulic machinery. She is the first ship to be fitted with a complete electric installation for doing all the important work connected with the guns, steering apparatus, &c., and is a prototype of the battle-ship being constructed by the same Company for the French navy, viz., the "Jauréguiberry." The electric installation is the joint work of MM. Canet and Lagane. The 24-cm. guns are furnished with a mechanical arrangement for closing the breech; the 12-cm. guns have the Canet breech arrangement for rapid firing by a single movement of the lever. The 24-cm. gun mountings are fitted with compressed air-presses for regulating the recoil. The muzzle velocities stipulated for were 680 m. (2,210 ft.) with a projectile of 170 kilos. (380 lbs.) for the 24-cm. guns, and the same with a 21 kilos. (46 lbs.) projectile for the 12-cm. guns. At the trials with smokeless powder the actual velocities obtained were, 740 m. (2,405 ft.) with the 24-cm. guns, and 800 m. (2,600 ft.) with the 12-cm. gun, without the gas-pressure of 2,400 atmos. being exceeded. The trials were carried out in presence of the Chilean Naval Commission, presided over by Captain Valenzuela Day, and under the direction of M. Louis, an engineer of the French navy, who has been temporarily lent for service under the Chilean Government. There were three steam trials, the first to determine the number of revolutions necessary for a speed of 17 knots, and to calculate the consumption of coal per H.P. by the hour. Result, 104 revolutions, I.H.P. 8,493, consumption of coal 0·609 kilo. The second trial, which took place with a strong S.E. breeze blowing, was on the official measured mile off the Hyères Islands; it lasted six hours, and was to determine the maximum speed under natural draught; this proved to be 17·8 knots with an I.H.P. of 9,648. The third and last trial was a 2½ hours run on the measured mile under forced draught, which gave a speed of 18·3 knots with 12,150 I.H.P. During the trials the ship was at her normal draught with her full coal supply on board. The French papers have been very loud in praise of the construction of the "Capitan Prat," and consider her success a proof that it is not necessary to build battle-ships of such large dimensions as those now under construction in England, France, and Italy. ("Le Yacht.")

France.—On the 1st April, in conformity with orders from the Minister of Marine, the crews of the Mediterranean Reserve Squadron and the reserve division of the Northern Squadron were filled up to their full sea complements for the summer instruction and manœuvres. The reserve squadron of the Mediterranean consists at present of the following ships:—

Battle-ships—"Richelieu," flag-ship of the Commander-in-Chief, Vice-Admiral de Boissondy; "Colbert," flag-ship of Rear-Admiral Prouhet.
Coast defence—"Terrible," "Caïman," "Indomptable."

2nd Class barbette cruiser—"Milan."

Avisos-torpilleurs—"Flèche," "Dague," and "Dragonne."

Torpilleurs-de-haute-mer—"Agile," "Aventurier," "Orage," and "Éclair."

According to "Le Petit Var," when the squadron left Toulon on the 5th ult., the mobilization ordered had not produced all the men required, and several of the ships left short of artificers and gunners. The active division of the squadron of the North consists at present of the following vessels:—

Battle-ship—"Victorieuse," flag-ship of Rear-Admiral Barrera, in command.

Coast defence—"Requin" and "Furieux."

3rd Class barbette cruiser—"Surcouf."

Torpedo cruiser—"Épervier."

Torpilleurs-de-haute-mer—"Turco," "Grenadier," "Déli."

The "Surcouf" has only since the beginning of April been attached to the squadron, having been in the dockyard hands, to have the necessary alterations made and her armament changed to quick-firing guns. The "Grenadier" is one of the latest type of torpilleurs-de-haute-mer, and at her trials last autumn attained the high speed of 24.5 knots. ("Le Yacht.")

The reserve division of the North, whose crews have just been completed for the summer manœuvres, consists of the following ships:—

Battle-ships—"Suffren," flag-ship of Vice-Admiral Lefèvre.

Coast defence—"Tonnerre" and "Fulminant."

Avisos-torpilleurs—"Lance" and "Salvi."

Torpilleur-de-haute-mer—"Vélocé."

As soon as they are ready for sea, the two divisions will unite under the command of Vice-Admiral Lefèvre. ("Le Yacht.")

The 1st Class barbette cruiser "Jean-Bart," which was to have returned to Rochefort from the Mediterranean for repairs and to exchange her present armament for the new quick-firing guns, has proceeded instead to New York to take part in the Columbus celebrations; the necessary alterations will be carried out on her return; her place in the squadron is to be filled by the 1st Class barbette cruiser "Alger," which ship having received her new quick-firing guns and undergone her trials successfully has left Cherbourg for Toulon. ("Le Yacht.")

The trials of the battle-ship "Magenta" off Toulon are proceeding satisfactorily; during a six hours' run under natural draught, she averaged 16 knots, the revolutions of the screw being 84; it is expected that under forced draught a speed of 18 knots will be attained. ("Le-Petit Var.")

Two 2nd Class cruisers were launched on the 18th April, the "Friant," at Brest, and the "Chasseloup-Laubat," at Cherbourg. These ships are improved "Suchet" type, which was again an improvement on the "Davout." Their dimensions, &c., are as follows: length between perpendiculars, 308 ft.; length, extreme, 319 ft. 10 in.; beam, 43 ft.; displacement, 3,722 tons; I.H.P., 9,000; estimated speed, 19.2, under forced draught. They have an armoured deck, varying from 8 cm. (3.1 in.) to 5 cm. (2 in.). Their armament will consist of six 6-in. Q.F. guns, four 4-in. Q.F. guns, eight 3-pr. Q.F., twelve 37-mm. (1.45 in.) Q.F., and six torpedo-tubes. Of the 6-in. guns,

one will fire forward and one aft, and the remaining four will be in spousons on either broadside. They will carry about 600 tons of coal and have a complement of 336 officers and men. ("Le Yacht" and "Petit Var.")

It is officially notified that from the 1st of April the torpedo-boats of the "Défense mobile" will be distributed as follows:—At Cherbourg, eight (4 first and 4 second class); Brest, eight (2 first, 4 second, and 2 third class); Lorient, six, (3 second and 3 third class); Rochefort, six (1 first, 2 second, and 3 third class); Toulon, ten (4 first, 4 second, and 2 third class); Corsica, eight (4 first and 4 second class); Algiers, six (3 first and 3 second class); Bone, five (3 first and 2 second class); Tunis, one at Biserta; Dunkerque, four (2 first class and 2 second class); this place has only lately been made a torpedo-boat station and the armoured gunboat "Flamme" is also to be stationed there. ("Le Petit Var.")

The established complement for mobilization of the auxiliary cruisers is as follows:—1 commander, who will be the captain nominated by the company to which the steamer belongs, 1 senior and 3 junior lieutenants, 1 chief gunner, first class; 2 second class gunners, 10 gunners, 8 trained men, 40 seamen, and 1 captain of the magazine. The engine room complement will be provided by the Company and also the necessary crew for working the ship. To avoid inconveniences of subordination, the senior lieutenant will be chosen junior in rank and age to the commander, who will receive a special commission on mobilizing. Twenty-five rounds of ammunition will be carried for each 14 cm. gun and 180 rounds for each 37 mm. Hotchkiss. Besides the "Normandie" the "Touraine," "Gascogne," "Bourgogne," and "Champagne" have been inscribed on the list, all belonging to the "Compagnie Transatlantique." And it would appear that six other vessels will be provided by the "Messageries Maritimes," four of which will be the "Australien," "Polynésien," "Armand-Bétrie," and "Ville de la Ciotat." ("Riv. Marittima.")

The Minister of Marine has decided that all officers who have been on the Retired List less than five years are eligible for service in the Reserve, with a view of obtaining a sufficient number of these officers to replace those on the Active List serving on shore, when the latter are called away for active service on board ship in case of mobilization. The officers will be nominated for the Reserve on application, provided they have not passed the prescribed limits of age. In consequence of the above, 17 captains, 46 commanders, 47 lieutenants, 1 inspector of machinery, 1 chief engineer, 27 engineers first class and 5 second class have already been added to the Reserve. ("Riv. Marittima.")

Italy.—The "Marine de France" gives the following as the disposition of the Italian naval forces at the end of February of this year:—Almost all the torpedo cruisers ("incociatore-torpediniere") of the type "Goïto" are laid up ("in disponibilità"); one Captain-Lieutenant with a small staff is in charge of each vessel, although in some cases the Captain-Lieutenant is responsible ("responsabile") for two ships. These cruisers of 740 tons (type "Goïto") and of 840 tons (type "Iride," an improved "Goïto"), and mostly of from 4,000 to 4,200 I.H.P., with a speed of from 18 to 20 knots, are new, and may all be considered capable of doing good work. Under this head come at Spezzia: the "Aretusa," "Goïto," "Minerva," "Monzambano," and "Urania"; at Naples, the "Montebello." Among the cruisers the "Piemonte" and "Vésuvio" form part of the active squadron; two others are in commission, the "Dogali" at Spezzia, and the "Bausan" at Naples: both these have since been despatched to New York to take part in the Columbus celebrations. Laid up at Spezzia are the "Etna" (also since sent to New York for the celebration) and the "Fieramosca"; at Naples the "Lombardia"; and at Venice the "Stromboli." In the small squadron of "torpilleurs" attached to the active squadron there do not appear to be any of the "avisos-torpilleurs," although the Italians possess some types of which any navy might be proud; such as the type "Nibbio" of 160 tons and a speed of 24 knots; the type "Saetta" of 400 tons and a speed of 20 knots.

The "Saetta" is laid up at Naples. The active squadron ("squadra permanente") is under the command of Vice-Admiral Noce, with Rear-Admiral Accinni as second in command; it is composed as follows:—

1st Division:—

Battle-ships—"Morosini," 11,000 tons and 16 knots speed. "Affondatore," 4,800 tons and 14 knots speed.

Cruiser—"Piemonte," 2,500 tons and 22 knots speed.

2nd Division:—

Battle-ship—"Dandolo," 11,000 tons and 15 knots speed.

Cruiser—"Vesuvio," 3,500 tons and 17 knots speed.

Torpedo-cruiser—"Partenope," 840 tons and 20 knots speed.

Torpedo-boats—Nos. 110, 114, 115, and 132.

The reserve division ("divisione navale in riserva") constituted on the 21st January, 1893, is under the command of Rear-Admiral Corsi, and consists of

Battle-ships—"Italia," 13,900 tons and 17 knots speed. "Andréa Doria," 11,000 tons and 16 knots speed.

Torpedo-cruisers—"Iride," 840 tons and 20 knots speed. "Euridice," 840 tons and 20 knots speed.

With regard to the ships laid up, the fastest and most powerful are in the ports on the west coast, nearly the whole of the disposable forces being concentrated at Spezzia and Naples, as follows:—At Spezzia—Battle-ships—"Duilio," "Lepanto," "Ancona," "San Martino," "Castelfidardo"; Cruisers—"Etna," "Fieramosca," "Flavio Gioia," "Savoia," "Aretusa," "Goïto," "Minerva," "Monzambano," "Urania," "Pietro Mica." At Naples—Battle-ships—"Ruggiero di Lauria"; Cruisers—"Lombardia," "Montebello," "Saetta." At Taranto—Battle-ships—"Re Umberto." At Venice—Cruiser—"Stromboli." The "Marine de France" criticises the composition of the two squadrons with regard to their tactical value as units for mobilization, and also the system of keeping the best and fastest ships laid up in reserve, laying down the maxim that it is better for fast ships to be employed at sea, as they are then kept in a better state of repair. According to the "Army and Navy Gazette," the permanent squadron has been reconstituted since the 1st of April, under the command of Vice-Admiral the Duke of Genoa, as follows:—

1st Division:—

Battle-ships—"Lepanto" and "Affondatore."

Cruiser—"Piemonte."

2nd Division (Rear-Admiral Corsi):—

Battle-ships—"Italia" and "Andréa Doria."

Torpedo-cruiser—"Iride."

3rd Division (Rear-Admiral Gonzales):—

Battle-ship—"Duilio."

Torpedo-cruisers—"Stromboli" and "Euridice."

Cistern-ship—"Tevere."

Three torpedo flotillas have been formed of 12 sea-going torpedo-boats.

The "Sardegna," another of the new battle-ships, is now approaching her completion (Plate 18). The ship has been built in the dockyard at Spezzia, and was launched on the 20th September, 1890; she is the same tonnage as the "Re Umberto," but is 9 ft. 9 in. longer, and the disposition of her armour is different, while her engines develop about 2,500 more I.H.P. than those of the latter, viz., 22,000 I.H.P. against 19,500. Her principal dimensions are as follows:—

Length between perpendiculars.....	406 ft.
Length extreme	422 "
Beam	75 "
Draught forward.....	30 "
" aft.....	32 "

Displacement	13,940 tons.
I.H.P. natural draught	15,200
Estimated speed	18 knots.
I.H.P. forced draught	22,800
Estimated speed	20 knots.

The hull is built of Siemens-Martin steel with the usual double bottom and water-tight bulkheads. Protection is afforded by side-armour extending from 3 ft. 3 in. below the water-line to the upper deck; the armour is not, however, carried the whole way round the ship, but at the water-line and for 3 ft. 3 in. above and below extends for a length of 234 ft. Above this again up to the upper deck, the armour covers the side for 215 ft.; the thickness of the plating, however, is only 4 in.; at each end of the belt 3-in. armoured athwartships bulkheads rise from the armoured to the upper deck. The armoured deck has a maximum thickness of 4·2 in., diminishing to 2 in.; it runs the whole length of the ship, rising amidships to a height of 3 ft. 4 in. above the water-line, and at the sides, where it joins the double bottom, it is 4 ft. 6 in. below. Between the armoured and battery decks run fore and aft both sides cofferdams divided into numerous compartments, which are filled with cellulose. Above the upper deck at each end of the armour belt are the two barbettes, in which are mounted the four heavy guns on movable turn-tables; these are protected by 15-in. armour, the power of resistance of which, however, is much increased by the slope of the plating. The ammunition tubes are protected by 12-in. plating, and are further protected by the side and athwartship bulkhead armour; the conning tower is also made of 12-in. plating, while the tubes bringing the electric wires, telegraph arrangements, &c., are protected with 6-in. armour. Her armament is as follows:—Four 343-mm. (68-ton) 13·8-in. guns, two in each barrette; eight 6-in. Q.F. guns in a covered-in battery, between the two barbettes; 16 Q.F. 4·7 guns, 12 of which are mounted on the deck over the 6-in. battery, and the remaining four one on each side of the barbettes; of the eight 6-in. guns, the two foremost can be trained right ahead, and the two after ones right astern; two 6-pr. for landing purposes; 12 57-mm. Q.F. guns (3-pr.) and 17 37-mm. Q.F. guns, two Maxim mitrailleuses and five torpedo-tubes, two under water and three above. There is one military mast, with two fighting tops; in the lower are mounted two of the 3-pr. Nordenfelts, and in the upper two of the 27-mm. Hotchkiss and a Maxim. The ship has 18 boilers, which are divided into six groups of three boilers each. Each group is in its own separate water-tight compartment, supplied with its own steam-pipe, ventilation and pumping and feed supply engines, so that it is completely independent of the five other groups. There are four sets of engines, two each side; the foremost can be disconnected, so that the after engines can be worked alone. ("Mittheilungen" from the "Italia Militare e Marina.")

MILITARY.

Austria-Hungary.—According to the "Allgemeine Militär-Zeitung," experiments were recently made at the Pressburg Cartridge Factory with the 8-mm. Mannlicher rifle against a bullet-proof material invented by Herr Syländer, and gave the most astonishing results. The material, which was found to be impenetrable at 50 m. distance, is only 10 mm. (0·393 in.) thick. It was really invented some two years ago, but until Dowe's invention was published Herr Syländer did not contemplate employing it as a body armour. The material is, of course, a secret, but it is known not to be either woollen, hemp, or wire; it is very light and the cost is a mere trifle. Herr Syländer, although satisfied as to the impenetrability of his material, is of opinion that neither it nor Dowe's armour can be usefully employed as a shield against bullets, as even if the armour is not penetrated the shock of the projectile will put the person hit *hors de combat*: at the same time, he believes that it can be of the greatest service in the form of a bullet-proof and easily transportable shield.

Belgium.—The field artillery remounts for 1893 consist exclusively of horses

bred in the country. The total number bought was 141, and the average price 840 fr. (33*l.* 12*s.*). For the extra strong horses required as wheelers for the 8.7-cm. guns as much as 1,000 fr. (40*l.*) were given.

The "Revue de Cavalerie," quoting from the "Belgique Militaire," gives a description of several improvements in the equipment of cavalry which are being tested in a troop of the 2nd Guides, under the superintendence of a committee. Among other devices is a mode of carrying the carbine *en bandoulière* invented by Sergeant-Major van Malder, of the 2nd Guides, which is said to be a remarkable success. Officers who are interested in this subject will find a full description of the van Malder system in the "Revue" for March, p. 638.

It is stated in the "Revue du Cercle Militaire" that the new rifle (Mausers. M/89) will be distributed in a few days to the 4th Division, when three-quarters of the Belgian infantry will be in possession of this arm. It is understood that the autumn manoeuvres of 1893 will be carried out by the 4th Division, and that the new smokeless powder of the Wetteren factory, adopted for the Service, will be used on a large scale with the new rifles.

Brazil.—The peace strength of the Brazilian army has been fixed by a recent decree as follows:—4 marshals, 8 generals of division, 17 generals of brigade, 60 colonels, 79 lieutenant-colonels, 142 majors, 438 captains, 490 lieutenants, 666 sub-lieutenants, and 24,877 men. In time of war the effective strength would be doubled. The number of recruits to be furnished by the several States, by voluntary engagement or by lot, is fixed at 3,000. From the 1st January, 1893, the term of service with the colours is to be 5 years, re-engagements being allowed for a minimum period of 2 years. Under certain conditions, grants of land are made to those who re-engage.

The peace establishment comprises 36 battalions of infantry (of 4 companies), 11 regiments of cavalry (of 4 squadrons), 2 squadrons of train, 5 regiments of field artillery (of 4 batteries), 5 battalions of fortress artillery (of 4 batteries), 2 battalions of engineers (of 4 companies, viz., 2 sapper and miner, 1 pontonier, 1 railway and telegraph).

The infantry, at present armed with the Comblain rifle (1874), will probably be provided with the Danish Krag-Jørgensen weapon of 8 mm. The cavalry is armed with Winchester and Spencer carbines, sword and lance. The artillery has at present Krupp guns of 75 mm., which, however, are to be superseded. ("Revue Militaire de l'Étranger.")

The "Revue du Cercle Militaire," No. 14, gives further particulars of the rifle said to have been approved by the Brazilian Government, which is spoken of as a modification of the Mauser and Mannlicher systems.

France.—In order to provide sufficient officers for the train, who are passed through the École Militaire de l'Artillerie et du Génie at Versailles, it has been decided that non-commissioned officers of the cavalry and artillery and sapper-conductors of the engineers may in future compete with those of the train for admission to the school; but, as a principle, at least one-third of the vacant places are to be filled up by non-commissioned officers of the train.

According to "L'Avenir Militaire," negotiations are proceeding between the Municipal and State authorities regarding the demolition of the walls of Bayonne, which render the extension of the city impossible. If these negotiations lead to a favourable issue, Bayonne will be turned into a large intrenched camp with an outer circle of forts which will cut off all access from Spain.

A central laboratory was opened in Paris on the 1st February for the testing of horse forage. It is conducted by a military apothecary and an administrative

officer, under the superintendence of the technical committee of the Intendance Department. The object of the institution is to analyse the articles of forage delivered by contractors and to diffuse information as to the distinctive characters of good and bad forage. According to "La France Militaire," samples are to be taken for analysis at uncertain times, at least once a quarter, from Government and troop stocks. The reports of the laboratory are to be considered merely as expressions of opinion on the nature of the forage examined, and are not intended in any way to relieve the Intendance officials from responsibility for the material issued by them.

It appears from "La France Militaire" that Military Attachés are attached to the embassies, &c., in the following States:—Germany, Austria-Hungary, China, Belgium and the Netherlands, Denmark, Sweden and Norway, United States, Great Britain, Italy, Spain and Portugal, Greece, Roumania and Servia, Russia, Siam, Switzerland, and Turkey. Of the 15 officers so employed, 4 belong to the infantry, 4 to cavalry, 5 to the artillery, and 2 to the engineers.

The cadre exercises, which proved so valuable for the instruction of officers in 1892, are to be carried out on a large scale this year. They will be held throughout the whole of the infantry of the standing army, and as a rule will be carried out divisionally; they may, however, be conducted brigade-wise at the discretion of divisional commanders. Thus in each infantry division there will either be manœuvres for the cadres of the division, or two series of brigade cadre manœuvres. Similarly there are to be divisional or brigade manœuvres for the cadres of the reserve in nine army corps. Cadre exercises are also to be carried out in 3 divisions and 1 brigade of cavalry. General staff exercises ("staff journeys") will also be undertaken by the staff of nine army corps. The exercises, under the general guidance of the supreme commanders concerned, will be carried out according to the orders of the several divisional and brigade commanders. Apart from the latter and the officers attached to them, the operations will be carried out, in the case of divisional exercises, by 3 staff officers from each infantry regiment, 2 artillery officers, 1 engineer officer, a staff officer or captain of cavalry and an intendant; in the case of brigade exercises, there will be 3 staff officers and 3 captains from each infantry regiment, and a cavalry officer. The scheme for the manœuvres to be carried out will be eminently practical, only such tasks being set as would be required on actual service, e.g., written orders of the higher commanders; verbal orders, as issued and accepted in the field; instructions in disposing the troops and taking up positions on the General Staff Map; superintendence of marches and operations. These exercises will occupy five days in the case of divisional manœuvres, and four days in the case of brigades. ("La France Militaire.")

Germany.—The following brief account of the coat of armour invented by Herr Dowe, tailor, of Mannheim, is taken from the "Allgemeine Militär-Zeitung." His earlier experiments were conducted secretly, and it was not until shortly before Christmas last that he felt justified in requesting the commander of a grenadier regiment in Mannheim to submit his armour to trials with regulation weapons. The first experiments were encouraging, as, although the bullets made holes in the material, they were flattened and fell behind the target. The outcome of these trials was the manufacture of an armour which is externally covered with the ordinary uniform cloth, and shields the breast and body of the soldier. The material is the secret of the inventor; it is elastic, easily attached to the uniform, hanging on the shoulder-strap buttons and being further fastened by buttons at the hips. Its weight is about 6 lbs. (German), and it does not interfere with the movements of the wearer. The arms, legs, and head are uncovered by it. According to the company commander of the 110th Regiment, who conducted the firing at 400, 300, and 200 m., the 7-mm. bullets did not penetrate the material. The inventor estimates the cost of each coat of armour at 14s.

The "Allgemeine Militär-Zeitung" gives the following details regarding the augmentation of the corps of cadets which was decided upon two years ago and was

realized at the beginning of April. On the 1st of the month the number of cadets at the principal establishment of Gross-Lichterfeld was 1,000, in addition to which there were 240 at Potsdam, 220 each at Cöslin, Bensberg, Wahlstatt, and Oranienstein, 200 at Karlsruhe, and 180 at Ploen; giving a total of 2,500, or a proportion of 15 cadets for every 100 officers of the permanent army.

Experiments have been recently made at Berlin with a new explosive, the expansive force of which is said to surpass considerably that of the best powders hitherto used for ordnance. The new material has the appearance of thick brown oil. Trials have also been made with it on board two armoured ships at sea. According to all accounts the results have been in every case surprising; but it is said that, so far, the new explosive can only be employed in guns, and has not been found suitable for small arms. ("Spectateur Militaire.")

The "Militär-Wochenblatt" draws special attention to two pamphlets dealing with the proposed new Military Law in Germany, which are said to give a very complete and clear account of the points at issue. The pamphlets are "Reichstag und Heer," by General v. Boguslawski (Berlin: Eisenschmidt. 1 mk.), and "Einst; Jetzt; Was dann?" by Major Graf Moltke (Berlin: Mittler. 40 pf.).

Mexico.—The "Rev. Mil. de l'Étranger" gives the following details regarding the Mexican army. Every Mexican fit to bear arms is bound to serve in the National Guard from his 20th to his 50th year, the permanent army being recruited by voluntary engagement. Including the reserve and general reserve, the army would have an effective total of about 160,000 men on the war footing, of whom 120,000 infantry, 26,000 cavalry, and 14,000 artillery, engineers, &c. The permanent army consists of about 40,000 men, comprising 26,000 infantry, 8,000 cavalry, and 6,000 of the other arms, &c. The infantry consists of 30 battalions, 30 battalion cadres, and 3 auxiliary battalions; the cavalry comprises 13 regiments and 6 auxiliary corps; the artillery is formed of 4 field battalions (of 6 batteries) and 1 fortress battalion; and the engineers consist of 1 battalion of pioneers. In addition to the above, there are 1 battalion of invalids, 1 squadron of train, 1 corps of gendarmerie, and 9 corps of rural guards. There is one military school, the college of Chapultepec, for the training and supply of officers, of whom 30 per cent. have passed through it. The artillery has the de Bange gun of 80 mm. The infantry are armed with the Remington, which, however, is shortly to be replaced by a magazine rifle of 6.5 mm., the invention of two Mexican officers, the brothers Mondragon.

Roumania.—The following particulars regarding the fortifications between the eastern spurs of the Carpathians, the Transylvanian Alps, and the bend of the Danube at Galatz, which will probably be completed during the summer, are taken by the "Deutsche Heeres-Zeitung" from the "Buletinul Publicatiunilor Militare." The works are placed along the line of defence Fokschani—Nemolvassa—Galatz, and consist of two lines. The advanced line is formed by 15 semi-circular batteries, the armament being protected by revolving turrets on the Schumann system. The guns, 345 in number, consist of 216 (? 210) 37-mm., 90 53-mm., 15 12-cm. guns, and 30 12-cm. mortars. The second line, which lies about 1,200 metres in rear of the first, consists of 42 batteries, in 14 groups of 3 batteries, the several groups covering the intervals of the first line. Each battery of the second line is armed with 4 53-mm. Q.F. guns and 1 12-cm. Q.F. howitzer, all in turrets of somewhat lighter construction than those in first line, and forming a total of 210 guns for the second line. As the guns of the latter line have a range of over 4,100 metres, the fire of 5 batteries can be combined.

In rear of this line, which is considered impregnable, the field army will be formed, and can there manœuvre in security and be ready to assume the offensive at a favourable moment. Even supposing the enemy to succeed in taking one or more of the advanced batteries and to direct his attack against the second line, he would find himself between the fire of that line and of the flanking batteries of the advanced

line. In short, the opinion is entertained that no enemy could take up a position between the two fortified lines without suffering such fearful losses that he would be utterly unable to withstand the attack of fresh troops. Moreover, it may be assumed that, although the complicated machinery can be handled with precision by men who are used to it, the guns would be of no use whatever to an enemy, even if he succeeded in obtaining possession of them.

Spain.—The following details regarding the new organization of the Spanish army are extracted from the "Deutsche Heeres-Zeitung":—

The infantry consists of 100 regiments of the line (50 active and 50 reserve), 20 active rifle battalions (combined in half brigades), and 10 reserve rifle regiments. The North African troops consist of 3 battalions and a disciplinary battalion. The Balearic and Canary Islands have regional garrisons of two regiments for each group of islands, with the corresponding reserve, cavalry, artillery, and engineer troops. Each infantry regiment consists of 2 battalions, the 2nd battalion consisting only of a nucleus. Exclusive of officers (46), the regiment is 700 strong on the peace footing, viz., 30 staff men, 600 in 1st battalion, and 70 in 2nd battalion; on the war footing the rank and file will number 30 staff men, and 1,000 in each battalion; total, 2,030. The 50 active line regiments and 6 rifle half-brigades will form 14 infantry divisions for the 7 army corps; the remaining 4 rifle half-brigades will form 2 independent brigades. Each active regiment has a recruiting district assigned to it, and the men pass into the corresponding reserve regiment at the beginning of their third year of service; similarly in the case of the rifles.

The artillery consists of 14 field and 2 mountain regiments, 10 fortress battalions, a central gunnery school, a remount commission, 4 artizan companies, and 7 reserve depôts. Each field regiment (peace footing) consists of 2 groups (divisions), the 1st of 2 batteries (6 guns and 7 wagons), the 2nd of the nucleus of 2 batteries. In war time the regiments will be organized in 2 groups of 3 batteries each, with an ammunition column for each group, and one for the regiment. In addition, 2 of these regiments will in peace time have a light horse artillery battery. The mountain regiments are similarly organized.

The cavalry consists of a royal body guard squadron, 28 active regiments (3 squadrons and the nucleus of a 4th, with 339 horses on the peace footing, and 541 on the war footing), 6 body guard and orderly squadrons, and 14 reserve regiments; besides local troops in the Balearic and Canary Islands and North Africa.

The engineers consist of 4 sapper and miner regiments, 1 pontonier regiment, 1 telegraph battalion, 1 railway battalion, 1 topographical brigade, 1 artizan detachment, and 7 reserve depôts; with a special sapper and miner company in the Balearic Isles. Each regiment consists of 2 battalions, 1 being merely a nucleus in peace time. The pontonier regiment and railway battalion consist of 4 companies, 2 being reserve companies.

Switzerland.—A Swiss tailor, M. Girard, of Granges (Soleure), has recently invented a material which he states is proof against rifle bullets, and, according to the "Rev. Mil. Suisse," he has submitted his invention to the Federal military department, with the object of having his material tested, with the view of its adoption in making up the uniforms for the Swiss army.

United States.—It is stated that, although the Government is, on the whole, satisfied with the recently adopted Krag-Jørgensen rifle of 0.30 in. (about 8 mm.), American inventors have been invited to submit proposals for the improvement of the arm in certain respects. The new arm, according to the "Rev. Mil. de l'Étranger," will be distributed to the troops in the summer.

The "Revue du Cercle Militaire" gives a short account of the works which have been in progress for the past two years to secure San Francisco against a *coup de main*. The works proposed to attain this object are not expected to be completed under two years, after which several batteries will be built, with the view of completely guarding the entrance to the bay.

FOREIGN PERIODICALS.

MILITARY.

Militär-Wochenblatt.—No. 29. "The Stranding of H.M.S. 'Howe.'" No. 30. Criticism of Lieut.-General H. Müller's "History of Fortress Warfare." "The Stranding of H.M.S. 'Howe.'" (concluded). "Dahomey." No. 31. "The Military Forces put in the Field by Germany during the War of 1870-71." "Müller's History of Fortress Warfare" (continued). No. 32. "Mobilization in former times and at present." "The Military Forces of Germany during the War of 1870-71" (continued). "Müller's History of Fortress Warfare" (continued). No. 33. "The French 'Loi des cadres.'" "The Military Forces of Germany during the War of 1870-71" (concluded). "Müller's History of Fortress Warfare" (concluded). "On Regimental Histories." No. 34. "Military Statistics. The German Losses during the War of 1870-71." "French Views of Manœuvres on a large scale." Notice of Mr. Laird Clowes' book "The Captain of the Mary Rose." "The new Russian Regulations as to the time at which Recruits are to join." No. 35. "Alteration of Uniform of the French Infantry Officers." "Reorganization of the Army School in Portugal." No. 36. "Memoirs of General Radet;" review of book. "Cadre exercises in France." No. 37. An article entitled "Zur Abwehr," combating an accusation made by the "Freisinnige Zeitung," that the "Mil.-Wochenblatt" had purposely published a false comparison of the French and German Forces. "The French Nation and Army." "Contribution to the History of the Prussian General Staff from 1808 to 1870." No. 38. "Contribution to the History of the Prussian General Staff from 1808 to 1870 (concluded)." "Firing Exercises of Infantry with the object of deciding tactical questions."

Beiheft zum Militär-Wochenblatt, 1893.—Hefte 3 and 4. "Impressions of a Military Tourist in the Caucasus and Southern Russia." By Rittmeister v. Drygalski.

Neue Militärwissenschaftliche Blätter.—April. "First Fights of the Army of the Rhine" (continued). "Military Service and National Education." "History of the Prussian Reserve Corps" (continued). "Experiences in Colonial Warfare." "Russian Military Life in Central Asia." "The War in Chili" (continued). "The French Army 150 years ago." Under the heading "Korrespondenz" is a very interesting article, dealing, among other Russian matters, with the great progress made during the past year in the training of the Russian army. Especially noticeable is the account of the so-called "Jagdkommandos," selected bodies of officers and men who are specially trained in scouting and practical exercises in all the duties which fall under the head of field service.

Jahrbücher für die Deutsche Armee und Marine. April. "The Naval Budget and the proposed Military Law." "The Italian Army during the latter half of 1892" (special report for the "Jahrbücher"). "Reflections on the Organization and Training of the Military Forces of Switzerland." "The French Cavalry Manœuvres of 1891-92." "Military Reminiscences of a Journey in Spain." "Field Service Exercises of Cavalry; the task set and its execution." "The most important Maps of Germany, France, and Europe in general, &c." (concluded). "The Russian Military and Naval Budget." "Gunshot Wounds from the Small-calibre Rifle."

Organ der Mil.-Wiss. Vereine.—Heft 3. "Moltke, and his Influence on the Operations of the Campaign of 1864." "On the Provisioning of Troops with Preserved Foods."

Journal des Sciences Militaires.—April. "Strategy of Marches." "Importance and Practice of the Study of Ground." "Tidikelt-Touat-Gourara and Algeria." "Cryptography" (continued). "The Campaign of 1814" (continued). "Study on Cavalry" (concluded). "The War Schools of Germany" (continued). "The Supply of the Bread Ration by Civil Bakers."

Revue Militaire de l'Étranger.—March. "Reorganization of the Staffs of Frontier Military Districts in Russia." "The New Artillery of the Krupp Company." "The Railway Troops of the Austro-Hungarian Army." In the "Nouvelles Militaires" is an account of the bridge equipment of the Austro-Hungarian army. April. "Instruction of the German Infantry Soldier in various kinds of ground." "The Fortified Places and Fortress Troops in Russia." "The New Spanish Rifle of 7 mm."

Spectateur Militaire.—1st April. "Simplicity and Method," (*à propos* of the French Infantry Drill Regulations). "Operations of Junot and Wellesley before Lisbon" (*continued*). "Tactics of the Wars of the Middle Ages" (*continued*). "Studies on the Campaign of the Loire" (*continued*). "The King's Gendarmes." 15th April. "A short 'Drill Regulation' Book" (a comparison of the length and contents of French and German Infantry Regulations). "Tactics of the Wars of the Middle Ages" (*continued*). "The King's Gendarmes" (*continued*).

Revue du Cercle Militaire.—No. 14. "The Armament of Infantry, and Professor Hebler's Formula." "Italian Railways" (*concluded*). "Russia's State of Readiness for War" (reproduction of the article in the "Militär-Wochenblatt," No. 22). No. 15. "The Conquest of the Air" (commencement of an essay on Aërial Navigation). "The Armament of Infantry, &c." (*continued*). "Russia's State of Readiness for War" (*continued*). No. 16. "The New Military Division of Spain" (establishment of seven Regional Districts, with corresponding Army Corps). "Russia's State of Readiness for War" (*continued*). "The Conquest of the Air" (*continued*). No. 17. "Russia's State of Readiness for War" (*concluded*). "The Conquest of the Air" (*concluded*). "The Armament of Infantry, &c." (*continued*). No. 18. "The March of a Field Column in Sud-Oranais (Algeria)." "The Servian Army" (a brief account of its organization).

Revue du Génie Militaire.—March-April. "The Fortifications in Sicily" (*à propos* of the discussion in the Italian Parliament regarding the danger to Sicily resulting from the French works at Bizerta). "The Defence of the Coasts of Germany explained in the Reichstag."

Revue du Service de l'Intendance Militaire.—Continuation of article on "The Administration of the Austro-Hungarian Army." "Organization of the New Analytical Laboratory for Forage."

Revue de Cavalerie.—March. "Letters of a Cavalryman. Cavalry on the Field of Battle" (*continued*). "The Supply of Men and the Remounts of the Cavalry of the Grand Army in 1806-7" (*continued*). "The Cavalry at the Manœuvres of the 9th and 12th Corps in 1892" (*continued*). April. "Cavalry on the Field of Battle" (*continued*). "The Horse" (Consideration of its necessity in modern warfare). "The Supply of Men and Remounts of the Cavalry of the Grand Army in 1806-7" (*continued*).

Revue Militaire Suisse.—April. "Swimming the Linth in 1799, according to the 'Mémoires' of General Baron Dellard." "The work of the Red Cross Societies."

NOTICES OF BOOKS.

Aide-Mémoire de l'Officier de Marine. By E. DURASSIER, Chef de Bureau au Ministère de la Marine, and C. VALENTINO. Paris: Baudoin, 1893. 3 fr. 50 c.

This is the sixth year of issue of this useful work of reference. In the introduction the authors have taken a new departure by adding a table of the modern ships in the navies of the different countries. In drawing up this table they have included all ships in commission or in reserve, including those recently launched which are sufficiently advanced to be undergoing their trials; on the other hand, they have excluded all vessels building or launched but not ready for trial and all ships more than 15 years old; the result is that they have struck off from the effective of the English fleet,

for instance, no less than 28 battle-ships, crediting England with an effective of only 34 armoured ships, 7 of which are the belted cruisers. France is credited with 32, but of these 8 are armoured gunboats and 1 is a belted cruiser. Other navies are treated in the same way. This table will be revised each year so as to show the progress made by each fleet. The work begins with a valuable *résumé* on international maritime law, which includes chapters on territorial waters, the definition of the term "ship of war," with its rights, immunities, and duties, &c., on merchant ships, naval ceremonial, reprisals, state of war, neutrality, blockade, contraband of war, right of search, and other kindred subjects; then follows the pay of officers of all grades in different navies; a most interesting and useful *résumé* of the different types of ships in the German, English, Austrian, Italian, and Russian navies, giving their systems of construction, description of machinery, armament, and defensive powers; followed by tables of the war-ships in all countries, giving the names, dimensions, armament, &c., of each ship. A chapter on the guns of the principal Powers, describing system of construction, breech-action, rifling, projectiles, and powder, comes next, accompanied by minute and exhaustive tables of great interest and invaluable for reference. An interesting chapter on torpedoes, submarine mines, torpedo-boats, torpedo-catchers, and torpedo warfare has taken the place of the chapter on the different systems of coast defence in previous issues. The work concludes with tables of the different submarine telegraph cables in all parts of the world, and a rank list of the officers of the French navy. For its handy size and the amount of information contained in it we have no hesitation in commending it to the attention of naval officers.

Taschenbuch für die Kaiserliche Marine, 1893. Berlin: Luckhardt. 4 mks.

This little book, which has entered on its second year of issue, is not of much interest to many outside the ranks of the German navy. It is edited by Lieutenant Capelle, at present serving on board the "Siegfried," and is a compilation of the various Imperial rescripts and regulations emanating from the Ministry of Marine and the authorities at the various naval ports relative to various Service matters, such as the entry of men for the active Service, the reserves, marine battalions, &c., their discharge; the regulations for leave for officers and their entry into the Reserve, the pension of officers, and allowances to widows, &c., regulations regarding promotion, appointments, courses of instruction, uniform, pay, and allowances, and other information of undoubted value to German naval officers, which is put together in a compact and convenient form. Had the editor added a rank-list of the officers of the German navy, such as is to be found in the "K. u. K. Almanach" and M. Durassier's "Aide-Mémoire," the value and interest of the little work for foreign officers would have been much increased.

The Organization and Tactical Use of Cavalry, Artillery, and Infantry. By Colonel C. L. HARVEY, A.A.G., Oudh District. London: Gale and Polden, 1893. 1s. 6d.

A useful manual for study by officers of the three arms, and especially by those who may be intrusted with a mixed command. The book is founded on a knowledge of the chief text books, and, though necessarily brief and didactic, is as a rule very clear and accurate. The first paragraph on page 11, regarding the employment of an escort to guns, is open to controversy. (10.)

Signalling Regulations. Compiled by Sergeant-Major F. W. SIBBALD, School of Signalling, Aldershot. Revised Edition. London: Gale and Polden, 1893. 1s.

This compact little manual, which is preceded by a preface by Colonel Keyser, comprehends all the regulations for the Army, Yeomanry, and Volunteers, regarding signallers, their dress and equipment. (10.)

The Franco-German War of 1870-71. By Field-Marshal Count HELMUTH VON MOLTKE. Translation revised by Archibald Forbes. London: Osgood, McIlvaine, and Co., 1893. 10s. 6d.

On the appearance of the work in its original English guise, there was ample reason to question the accuracy of the rendering from the German offered by the

joint translators, but no such criticism is needful with regard to the present issue. Mr. Forbes combines a practical knowledge of soldiering with literary skill, and, whatever the original value of the German work may be, it has lost little or nothing at the hands of the distinguished war correspondent. The reader will find a few rugged sentences in Mr. Forbes' revision, together with a few unsightly misprints, but none of these faults will prevent his gaining a clear grasp of the author's meaning, and, as a whole, the translation now offered is far less unworthy of the subject and of the writer than the two-volume edition which appeared last year. The notes appended by Mr. Forbes are generally useful and interesting, but the allusion to a 2nd and 3rd French Army in the note on page 106 would seem to require some further explanation, and the attack on Lord Wolseley in the note on page 323 might with advantage have been omitted from a work of this nature. (10.)

History of the 57th (West Middlesex) Regiment of Foot, 1755—1881. By Captain H. H. WOOLBRIGHT. With maps and illustrations. Bentley, 1893. 406 pp. 30s.

An interesting and well-prepared book, with an accurate chronological index, and dates in the margin of each page. The 125 years of this fine regiment's record cover many a page of the history of this country and the formation of its Empire. The struggles and difficulties of the task are perhaps too lightly treated by men of the present generation, and the study of regimental accounts such as that of the "Die Hards" of Albuera brings into prominence those masterful characteristics of our race which have given this island the Empire of India and the position as a first-class Power in the world which we now hold. The surrenders of Cornwallis and of Burgoyne, the capture of Badajoz after two unsuccessful attempts, the crowning victories of Vittoria and Toulouse, the mismanaged failure in the Crimea of the 18th June, and the final occupation of the Redan, Sir Hugh Rose's avenging column in Central India, the wearisome skirmishes and ambuscades in the New Zealand war, and the relief of Eshowe, are all marks graven deep in the history of England, and in that graving the 57th Regiment bore no mean part. (10.)

Illustrated Histories of the Scottish Regiments. Book I. 1st Battalion, "The Black Watch" (Royal Highlanders), 42nd Foot. By Lieutenant-Colonel PERCY GROVES. Illustrated by HARRY PAYNE. W. and A. K. Johnston, 1893. Price 3s.

This series, when completed, will comprise all the Scotch regiments. The Black Watch originated in the formation of independent companies under Highland chiefs in 1729, for service in the mountain districts of Scotland. In 1739 the regiment was embodied as the 43rd. In 1743 it marched to England for employment in Flanders, but the men considered this as contrary to their articles of enlistment, left their officers, and marched homewards. On the surrender of the regiment 200 men were drafted to other corps, and the rest embarked for the Low Countries, to join the army under Lord Stair. They behaved admirably in 1743-4, and made gallant efforts to gain the day at Fontenoy. Before the return of the regiment in 1745, three companies were raised in Scotland, and fought at Preston Pans. After Culloden the regiment took part in two raids on the French coast, again going to Holland for the next three years.

In 1749 they became the 42nd, and seven years afterwards went to America and distinguished themselves in the attack on Ticonderoga.

A 2nd battalion was raised in 1758, and sent on active service to the West Indies, and both battalions were united the next year in America, where, in 1760, they assisted in the capture of Montreal. They fought again in the West Indies in 1761, and after the capture of Havannah the 2nd battalion was reduced. During the next half-dozen years the regiment was constantly on service against the American Indians.

In 1776 they took part in the War of Independence, and in 1782 passed to Nova Scotia. Meanwhile a 2nd battalion had been raised which, in 1781, sailed to the East Indies, was afterwards constituted the 73rd, and so remained until 1881, when they rejoined their old corps as 2nd battalion Royal Highlanders.

In 1795 the battalion did noteworthy service at Guidermaiken. Scarcely home,

they left for the West Indies, whence, in 1798, they went to Gibraltar, joined in expeditions to Minorca and elsewhere, until 1801, when they went to Egypt, and, if possible, enhanced their reputation at the landing in Aboukir Bay. Three weeks later they took a prominent part in the battle of Alexandria. In 1803 a 2nd battalion was again raised. In 1805 the 1st battalion went to Gibraltar, and in 1808 to Portugal. They were at Corunna in 1809, and in the same year were almost destroyed by sickness at Walcheren, whilst the 2nd battalion was off to the Peninsula, and there served throughout 1810-11. The 1st battalion joined in 1812, when the 2nd went home, and was disbanded a few years later. From early in 1812 until July, 1814, the 1st battalion remained in the Peninsula and in France, and after a few months' comparative rest in Ireland, went to Ostend for the Waterloo campaign. After Waterloo they went on to Paris till the end of the year, and after some 40 years' service at various foreign and home stations, embarked for Turkey in 1854, and served throughout the Russian war. After a year at home, the Mutiny hurried them off to India in 1857, where they remained for 10 years. In 1873 they went to Ashanti. The close of 1874 saw them at Malta, and in 1878 at Cyprus, in which year they came home. In 1882 the battalion sailed for Egypt, saw what fighting was to be seen, remained at Cairo for 18 months, went to Suakin, and fought at Tokar and Tamai. In 1884 they went up the Nile, and were at Kirbekan. After the fall of Khartoum they returned to Cairo for a year, and then on to Malta and Gibraltar, whence they were hurried off again to Egypt in the present year.

The appendices give, among other interesting details, a splendid nominal roll of recipients of the Victoria Cross and of other military decorations. The coloured illustrations represent the various uniforms worn by the regiment during its long history. (10.)

LIST OF RECENT FOREIGN BOOKS (NAVAL).

Dictionnaire des Termes de Marine Français-Anglais et Anglais-Français. Par WITCOMB et TIBET. 2 vols. Paris: Bureaux du "Yacht." 15 fr.

Dizionario tecnico e nautico di marina, in 4 lingue: italiana, francese, inglese e alemanno. Par DABOVITCH. 1 vol. Paris: Bureaux du "Yacht." 42 fr.

Les Neutres, étude juridique et historique du droit maritime. Par le Capitaine GODCHOT. 1 vol. Paris: Bureaux du "Yacht." 7 fr. 50 c.

Électricité expérimentale et pratique, cours professé à l'école des officiers torpilleurs, avec figures et planches. Par H. LEBLOND. 4 vols. Paris: Bureaux du "Yacht." 26 fr.

La Marine française de 1792 à nos jours. Album de photographures d'après l'œuvre de F. ROUX, avec texte et notices de l'Amiral Paris. 1 vol. Paris: Bureaux du "Yacht." 15 fr.

Deutsch' See-Gras. Ein Stück Reichsgeschichte. By Vice-Admiral BATSCHE. Berlin: Paetel and Co. 10 mks.

Helgoland und die deutsche Flotte. By Captain STENZEL. Berlin: Ulrich, 1893. 75 pfg.

(MILITARY.)

L'Armée de la Loire. By GRENET. Paris: Grenier, 1892. 3 fr. 50 c.

Du Rôle Stratégique et Tactique de la Cavalerie. By A. A. Paris: Berger-Levrault, 1892. 2 fr.

L'Armée et la Cavalerie Italiennes. By A. A. Paris: Berger-Levrault. 3 fr.

La Cavalerie Française. By Captain H. CHOPPIN. Paris: Garnier. 16 fr.

La Cavalerie Allemande. Histoire, Organisation, Recrutement, Avancement, Administration, Instruction et Discipline. Un volume grand in 8vo de 786 pages, avec 42 gravures (portraits, uniformes anciens et modernes, plans de batailles, etc.). Paris: Berger-Levrault, 1892. 10 fr.

Équitation Diagonale dans le Mouvement en avant. (L'action combinée des rênes et des jambes a lieu comme les allures du cheval, c'est-à-dire en diagonale. Le mécanisme des aides n'est autre qu'une succession d'effets diagonaux.) Paris: Berger-Levrault, 1892. 2 fr. 50 c.

Courses Militaires. Circulaire Ministérielle du 21 Février, 1892, et Règlement du 8 Février, 1892, sur les courses militaires. Paris: Berger-Levrault. 25 c.

Traité Théorique et Pratique des Matières Explosives. By LÉON GODY. Paris: Michelet, 1893. 5 fr.

Conférences sur l'Artillerie de Campagne, à l'Usage des Officiers des autres Armes. Paris: Berger-Levrault, 1892. 2 fr. 50 c.

Formation und Taktik der Französischen Armee. Berlin: Eisenschmidt, 1893. 5 mks. (A reliable account of the French army, and well up to date.)

Leitfaden für den Unterricht in der Feldbefestigung. By Colonel M. VON BRUNNER. 6th edition. Vienna: Seidel, 1893.

Studie über eine Kriegsgemässe Lösung unserer technischen Armee-Frage (Festungswesen, technischer Dienst im Felde und Friedensaudienst). By Major-General VON KILLICHES. Graz: Hans Wagner, 1892.

This book is highly spoken of by the "Allgemeine Militär-Zeitung" as a valuable contribution towards the settlement of the question of the most advantageous organization of engineers and pioneers.

Die Festung Langres während des Krieges, 1870-71 (Kriegsgeschichtliche Einzelschriften. Herausgegeben vom Grossen Generalstabe). Berlin: Mittler, 1893. 1 mk. 60.

Der Felzug gegen den Loir und die Einnahme von Vendôme am 15 und 16 Dezember, 1870. By Captain VON KORTZFLEISCH. With plans. Berlin: Mittler, 1892. 3 mks. 60. (Highly spoken of in the "Militär-Literatur-Zeitung," No. 4.)

Heeresbewegungen und Märsche. Taktische und Kriegsgeschichtliche Studien. By Colonel CARDINAL VON WIDDERN. Leipzig: Reisewitz, 1892. 7 mks. 20.

This is the 4th and completely rewritten edition of the author's "Handbuch für Truppenführung und Stabsdienst."

Der Volkskrieg an der Loire im Herbst, 1870. By FRITZ HOENIG. (In 2 vols.) 1st. vol. With maps. Berlin: Mittler, 1893. 10 mks.

Militärärztlicher Dienstunterricht für Einjährig-freiwillige, Aerzte und Unterärzte, &c. By Dr. KOWALK. Berlin: Mittler, 1893. 4 mks.

Leitfaden für den Unterricht der freiwilligen Krankenträger (Sanitätskolonnen). By Dr. RÜHELMANN. 7th edition. Berlin: Mittler, 1892. 1 mk.

Two books on first aids to the wounded, &c., well spoken of in the German press.

Der Nord-Ostsee-Canal. Seine Entstehung-Geschichte, sein Bau und seine Bedeutung in wirtschaftlicher und militärischer Hinsicht. By C. BESEKE. With plans. Leipzig: Lipsius, 1893. 3 mks. 60.

Millecinquecento Temi, &c. By Capitano DIONIGI ROMANETTI. An admirable selection of 1,500 texts for essays on general subjects, and on various branches of military science. Turin: Roux, 1893. 6 lire.

The "Militär-Literatur-Zeitung," No. 4 of 1893 (issued with the "Militär-Wochenblatt," No. 28), contains an account of the Russian periodical military literature during the year 1892 (concluded).

